SOUTHERN

July, 1943 25 Cents

# Aeronautical Flight

1st copy to Central Serial Record JUL 26 1943

CIVIL AIR PATROL EDITION

THE LIBRARY OF CONGRESS SERIAL RECORD AUG 6 1943 COPY 2


## PROPELLERS
*over the Mediterranean*

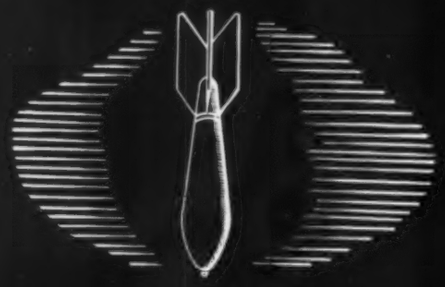
The blue Mediterranean, key to the military situation in southern Europe and gateway to the East, is rapidly coming under Allied domination, thanks in large part to superior air power. In these operations Liberators and Flying Fortresses are at the spearhead of the attack—all equipped with Hamilton Standard Hydromatic propellers.

**HAMILTON STANDARD PROPELLERS**

EAST HARTFORD, CONNECTICUT

ONE OF THE FOUR DIVISIONS OF UNITED AIRCRAFT CORPORATION

JUL 23 1943 ©CIB 594605



# Who Wins Wars?

Strangely enough, the average man does! Much as we all detest war the fact is that under its stimulation a nation always develops new products with infinite peacetime applications. To date, scores of fantastic devices have been created for war purposes which one day will contribute mightily to the American Way of Life. Weatherhead is producing at the rate of *millions every day* many products that have peacetime application. Just as we've helped build cars, planes and refrigerators in the past, Weatherhead is well prepared to help you build these new products of tomorrow.

*Look Ahead with*

# Weatherhead

THE WEATHERHEAD COMPANY, CLEVELAND, OHIO

*Manufacturers of vital parts for the automotive, aviation, refrigeration and other key industries.*

Plants: Cleveland, Columbia City, Ind., Los Angeles
Canada—St. Thomas, Ontario

## STALWART STRUCTURES
## SENSITIVE CONTROLS
## are the
# KEYSTONE OF AIR POWER

Between the Aleutians and New Zealand is a range of fighting conditions that is a constant challenge to the best engineering and fabricating talent in America. Pitching flight decks, makeshift jungle fields, arctic cold and tropical heat, sand, tempestuous rain, ice and snow — these are the conditions of flying . . . *day and night!* American boys have the stamina to fight everywhere. GENERAL AVIATION is helping to supply the flying equipment that fights everywhere!

*Aircraft Structural and Control Parts*

# GENERAL AVIATION
## EQUIPMENT COMPANY, INC.

**ASHLEY AND WILKES-BARRE, PENNSYLVANIA, U. S. A.**

*Detroit . . . . 417 Curtis Building, Telephone Madison 2146*
*New York District Service Engineer . . . . E. Harry Howard*
*33 Short Drive, Manhasset, N. Y., Telephone 2737*
*Buffalo District Service Engineer . . . . . E. J. Pillsbury*
*106 Parsells Ave., Rochester, N. Y., Telephone Monroe 3422*

**NOW** — a new OIL-LESS BEARING PULLEY

# MASTERPIECE IN METAL

To the skilled metallurgists who have chosen its tough steels and hard alloys, there is beauty in the Allison's metals.

To the seasoned engineers whose slide rules and drawing boards have crystallized their dreams, the beauty lies in the design of the compact, smooth-working parts.

To the master mechanics whose skill produces mirror-like surfaces and precise fits, it is the superb machining that is beautiful.

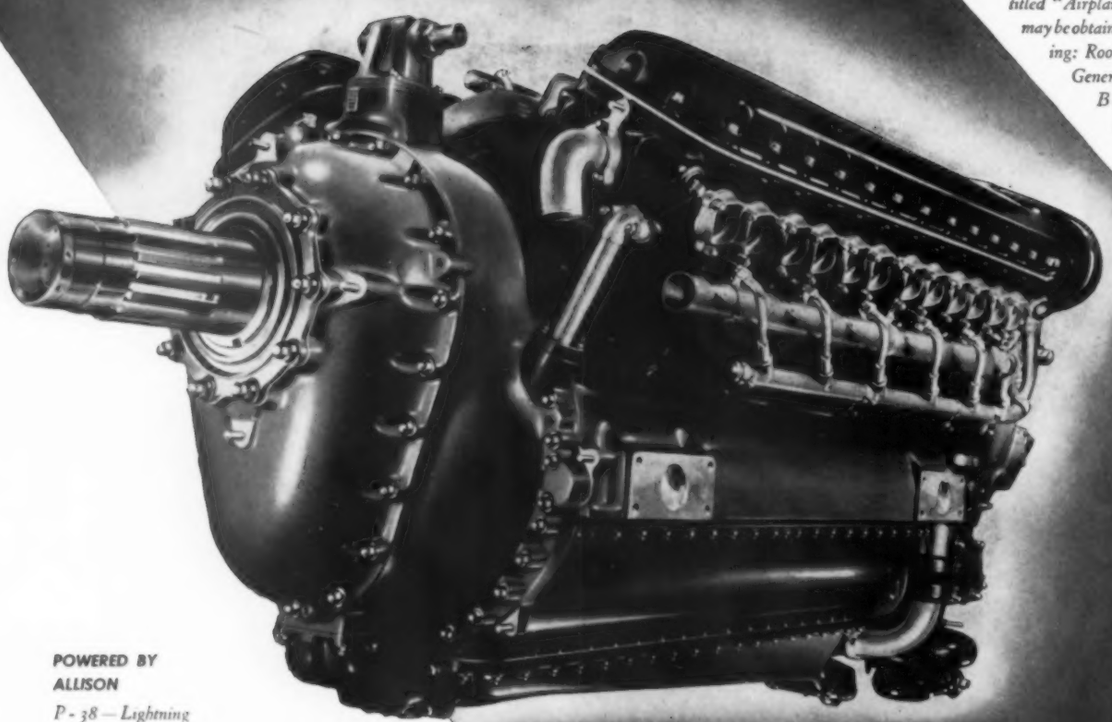
But beauty is as beauty does.

So to the pilot on the fighting front, the sum of all this is the beauty of performance—the dependable, unfailing action so vital to his mission and his safe return.

And to General Motors, whose purpose was to produce one of the world's finest aircraft engines, the beauty of the Allison lies in its record of accomplishments on fighting fronts that circle the globe.

★

*A comprehensive booklet entitled "Airplane Power" may be obtained by writing: Room 11-230, General Motors Building, Detroit 2, Mich.*



**POWERED BY ALLISON**

*P-38—Lightning*
*P-39—Airacobra*
*P-40—Warhawk*
*P-51—Mustang*

**LIQUID-COOLED AIRCRAFT ENGINES**

Allison

DIVISION OF

GM GENERAL MOTORS

# Message on the Fly!

"SEND ammunition immediately!"—a typical wartime message that often can't be sent by radio for fear of enemy detection. This is where the Piper L-4 "Grasshopper" renders a real service. By following the method pictured above, the Piper L-4 swoops down, picks up the message on the fly with a hook and speeds it to headquarters. This is but one of many wartime uses of the Piper L-4. The development of these uses will result in a finer peacetime Piper Cub for you.

**FREE BOOKLET ON HOW TO FLY.** Send today for your copy of "You, Too, Can Fly!" If you also want the full-color Piper catalog, enclose 10c in stamps or coin for postage-handling. Piper Aircraft Corporation, Dept. SF 73, Lock Haven, Penna.

William T. Beck

**PIPER *Cub***

*Points the Way to Wings for All Americans*

GUIBERSON LIGHT WEIGHT DIESEL

POWER

FOR PLANES

Using fuel that will not burn even when exposed to open flame, the Guiberson completely eliminates power plant fire hazard. And every pound of fuel, although it costs only a fraction as much as high octane gasoline, gives 30 per cent greater operating range. For low-cost, dependable operation without fire hazard or radio interference—it's the GUIBERSON.

AMERICA'S RADIAL AIR-COOLED DIESEL ENGINE

Guiberson U.S.A.

GUIBERSON DIESEL ENGINE COMPANY
Dallas, Texas
THE GUIBERSON CORPORATION
*Aircraft and Heater Division*

ATC
NO. 220

ESTABLISHED 1919

# Southern Flight

The only complete monthly digest of aeronautics in the South and Southwest

JULY, 1943 VOL. XX, NO. 1

## CONTENTS

### SPECIAL FEATURES

CIVIL AVIATION'S WAR AGAINST THE U-BOATS . . . . 24

FORMULA FOR FIGHTERS—by Major Al Williams . . . . 30

ABOUT SUPERCHARGERS . . . . . 33

LET'S LOOK AT THE RECORD—by Charles I. Stanton . . . 36

THE ARIZONA WAY—by Esther H. Forbes . . . . . 42

FINISHING SCHOOL FOR FIFINELLAS . . . . . 44

SUCCESS IN SAFETY—by G. S. Hastings . . . . . 46

### REGULAR FEATURES

JUST AMONG OURSELVES—Editorials and Comment . . . 14

THE SKY'S THE LIMIT—by Bill Green . . . . . 28

YOUR INDUSTRY—News of the Month in Review . . . . 52

AIRLINES . . . . . 56

NEW PRODUCTS . . . . . 57

HEADLINERS . . . . . 59

PORTS OF CALL—Correspondence from the Airports and Airways . 61

*Published Monthly by*

AIR REVIEW PUBLISHING CORPORATION

GEORGE E. HADDAWAY, *President* R. T. GIDLEY, *Secretary-Treasurer*

P. O. Box 750 (1901 McKinney Ave.), Dallas (1), Texas

ON LEAVE WITH CAP COASTAL PATROL: Major George E. Haddaway.

BOARD OF EDITORS: Tom Ashley, Editor; Bill Green, Esther H. Forbes, Jack Story.

BUSINESS STAFF: R. T. Gidley, Conard Baker, Jr., Jodie Ligon.

FIELD REPRESENTATIVE: Tony Hagmann.

N. Y. REP.: Harold Ives, Room 1011, 247 Park Ave., Tel. Eldorado 5-6589.

CHICAGO REP.: Dalton M. Andrews, 360 N. Michigan Ave., Tel. STAte 7622.

SUBSCRIPTIONS—United States: One year $2.00, two years $3.00.

SOUTHERN FLIGHT, July, 1943. Vol. 20, No. 1. Published monthly. Publication office, P. O. Box 750 (1901 McKinney Avenue), Dallas (1), Texas. Price 25c single copy. Subscription rates: United States, One year, $2.00; two years, $3.00. Established February, 1934. Entered as second-class matter at the Post Office, Dallas, Texas, under act of March 3, 1879. Copyright, 1943, by Air Review Publishing Corporation.

# Jap-hunting without a gun!

**THE TRUE STORY OF HOW A CRIPPLED LOCKHEED LIGHTNING OUTFLEW 13 JAP ZEROS AND GOT HOME, SAFE!**

**1.** With cameras instead of guns in its nose, a P-38 Lightning was photographing the Jap

base of Rabaul. Suddenly ten Zeros dove out of the sun, and before the American pilot knew what was happening, tracer bullets were ripping into his plane and then one engine conked out on him.

**2.** Somehow, with only one engine left, he had to get away from those ten Zeros. He pulled back the stick, jammed down the throttle, pointed her nose at the sky. By the time the Japs came to, he was five miles up and on his way home.

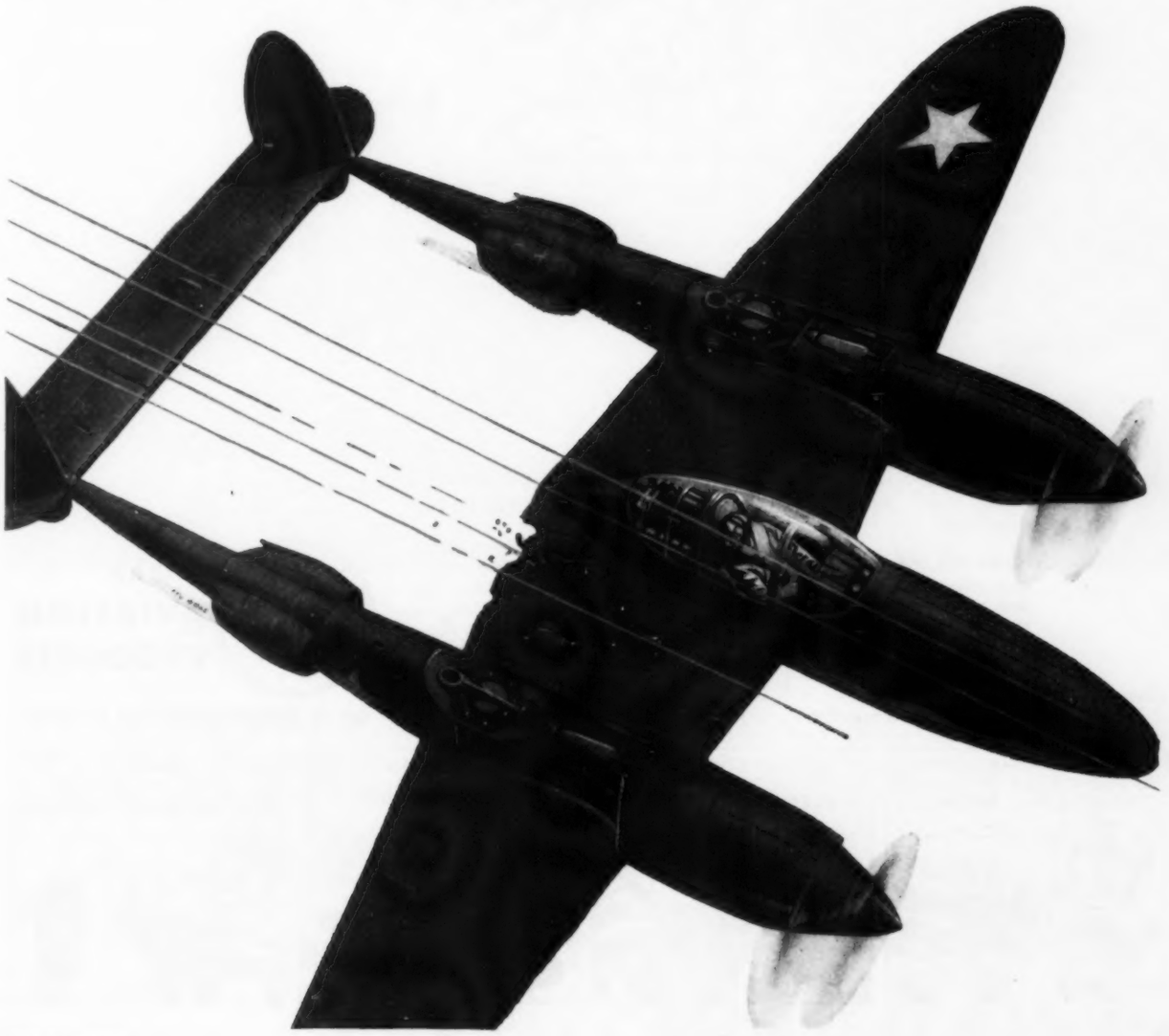
**3.** 400 miles later, three more Japs started a deadly game of hide and seek. Still going on one engine, he streaked straight out over the ocean and "Just ran 'em out of gas!" Yes, he

ran them out of gas . . . but he also ran clear back to New Guinea with photographs that were vital to our Coral Sea victory.

**4.** The Lightning is used as a camera plane because it can fly faster, higher, and farther than any enemy fighter—can take punishment and still deliver the goods. These qualities result from many months of designing and testing. From hundreds of wind tunnel experiments we developed the non-stall wing design that makes it impossible for a P-38 to go into a tail-spin even on one engine. It's this sort of careful designing and testing that give every Lockheed and Vega plane *extra* strength and *extra* dependability.

*Copyright 1943, Lockheed Aircraft Corporation, Vega Aircraft Corporation, Burbank, California. Member Aircraft War Production Council, Inc.*

**LOOK TO *Lockheed* FOR LEADERSHIP**



# The Birdmen's Perch

The war news has been pretty good lately, eh?

Out in the Pacific area, for the first quarter of '43, we averaged 7 Jap planes for every one we lost.

And then we did some socking in Tunisia, and up in the Aleutians, and practically every place you can think of in Europe . . . remember how the British smoked those big dams in the Ruhr—?—

*But we haven't won the war yet!*

Because as long as boys from Iowa have to fight in steaming Pacific jungles . . . as long as men must travel thousands of miles from their jobs, their wives, and their children to protect them from Axis savages . . . as long as wooden crosses bearing American names are being stabbed into the ground all over the world, *we haven't won the war YET!*

Are you doing everything you can to shorten the war? Are you buying *every* War Bond you can?

*Major Al Williams,*
alias, "Tattered Wing Tips," Gulf Aviation Products Manager, Gulf Bldg., Pittsburgh, Pa.

## TWO CHAMPS

How about that B-17—?—

The engineers put their heads together . . . they figured and they calculated . . . they mulled and they experimented . . . and when they got through, the B-17 could carry (and drop!) a *tripled* load of bombs. Mind you, this great increase in the B-17's ability to carry loads was achieved without any drastic changes in its basic engineering.

The engineers simply "cleaned-up"—and now the B-17 is unbelievably efficient!

Gulfpride Oil went through the same kind of "growing pains" as the B-17. Gulfpride was the best lubricant we knew how to refine—but our lubrication engineers and laboratory experts decided that maybe there was something about refining that we *didn't* know.

So they put *their* heads together . . . and *they* figured and calculated and experimented. And when they got through, Gulfpride could carry much greater lubrication loads! They achieved this greater efficiency in lubrication by devising a way to get *more* of the carbon-makers and *more* of the sludge-formers out of the crudes, and called the technique the Alchlor Process.

The Alchlor Process simply "cleaned-up"—and now Gulfpride is unbelievably tough and efficient.

## SIMULTANEOUS CAVU AND ZERO ZERO BRAINTWISTERS

A combat pilot got into two scraps over Burma. In the first fight he fired ⅓ of his ammunition before he got his Zero. The second scrap cost him ⅔ of his remaining ammo. When he got back to his base, he still had 120 rounds per gun left.

Well!—don't sit there! Start figuring how many rounds per gun he started out with! (Naturally, guns had identical rates of fire and were loaded with belts of identical lengths.)

## DOWN WITH DUST!

You Perch Pilots probably know better than most people that dust is nasty stuff.

You know what it can do to your engines . . . how a flurry of dust can ruin a "perfect" landing by obscuring the surface of the runway . . . and you know that a throatful of dust is one of the things you'd be glad to do without.

In wartime, dust is a downright menace—leveling off too high in a hot ship is no fun. It's no fun to drill on a dusty field, day after day, either. Both operations are risky to a man's health.

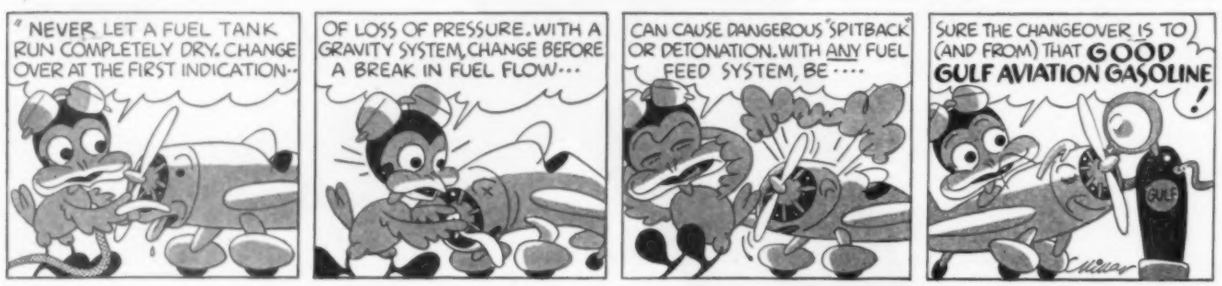
Gulf Sani-soil-Set is a special compound

which not only lays or binds dust, but has a definite germicidal value in killing or controlling germs which are frequently carried by dust. It's widely used on drill fields, temporary airports, landing strips, and runways.

**Gulf Oil Corporation and Gulf Refining Company...makers of**

**GULF AVIATION PRODUCTS**

**OIL IS AMMUNITION—USE IT WISELY**


"NEVER LET A FUEL TANK RUN COMPLETELY DRY. CHANGE OVER AT THE FIRST INDICATION··
OF LOSS OF PRESSURE. WITH A GRAVITY SYSTEM, CHANGE BEFORE A BREAK IN FUEL FLOW···
CAN CAUSE DANGEROUS "SPITBACK" OR DETONATION. WITH ANY FUEL FEED SYSTEM, BE····
SURE THE CHANGEOVER IS TO (AND FROM) THAT GOOD GULF AVIATION GASOLINE!
GULF

# *Triumph* IN TUNISIA!

CURTISS P-40 Warhawks dealt their full share of knockout blows in the crushing defeat of the Axis in Africa.

In helping to rid the skies of enemy fighters, in demolishing air-borne reenforcements, in crippling the movement of mechanized enemy forces, they added another chapter to a record which began with the earliest days of the war.

**CURTISS-WRIGHT**
*Corporation*
*AIRPLANE DIVISION*
Member: Aircraft War Production Council, East Coast, Inc.

## CURTISS *WARHAWKS*

WHILE YOU READ THIS MAGAZINE—

# we'll build ANOTHER AIRACOBRA

Remember the long, hard, bitter months when U. S. Airpower consisted more of plans than of planes?

We asked you to believe that from our aircraft industry would come planes in thousands and tens of thousands. We think you deserve some good news now.

How's this: *In the time it takes you to read this magazine we'll put another Airacobra into the sky.*

Another front line fighter plane. Another "cannon on wings." Another concentrated dose of very bad medicine for the Axis.

You'll understand why we can't tell you how many hundreds of Airacobras we'll build this month, how many thousands we'll build this year.

When you lay down this magazine, just think it over a moment. Another deadly weapon in the sky—then another and another and another. Morning, afternoon, night. Seven days a week.

Summer, autumn, winter, spring.

Think it over, and join us in a humble word of thanks for the skilled and willing hands of American workers.

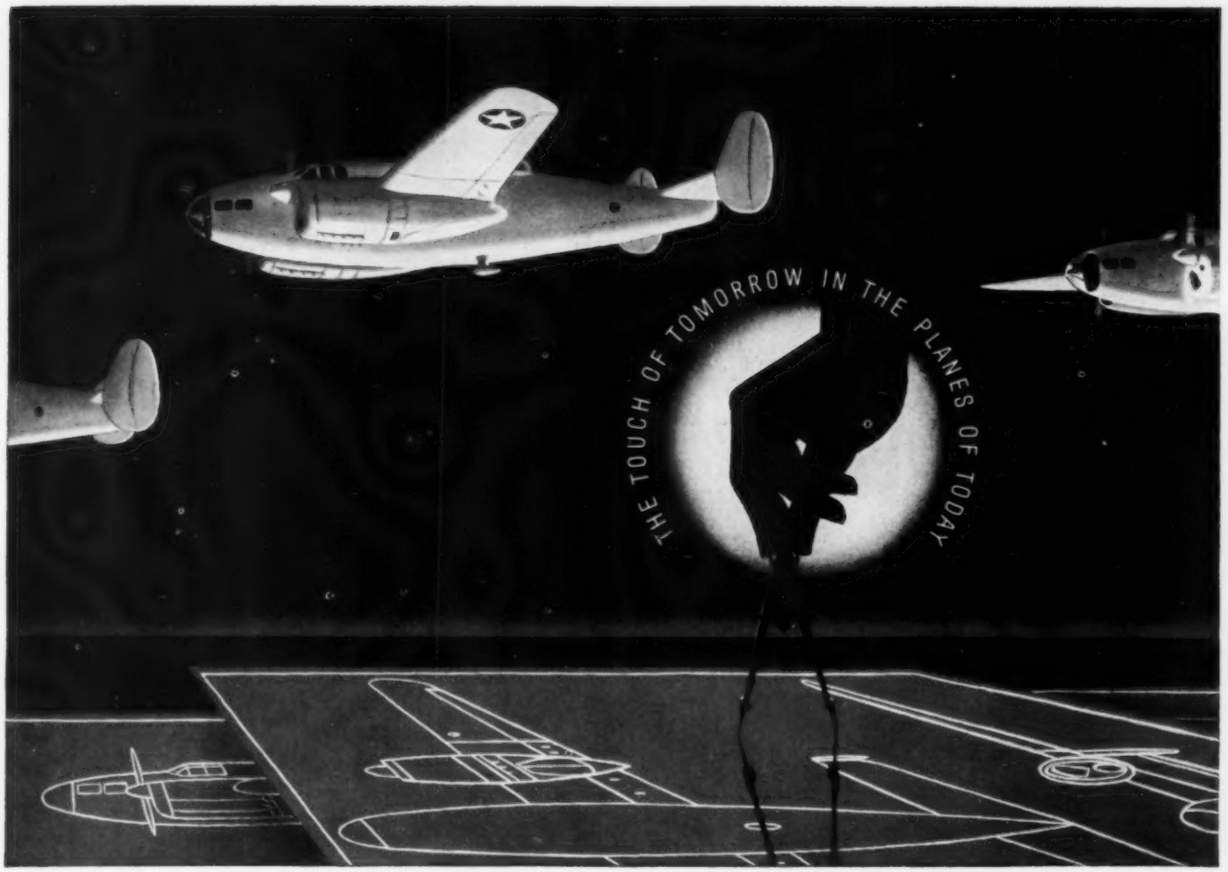
© Bell Aircraft Corporation, Buffalo and Niagara Falls, New York.

*Airacobras for victory—*

FUTURE PLANES FOR PEACE

**BELL** *Aircraft*

PACEMAKER OF AVIATION PROGRESS




# From Plans to Planes at Wartime Speed

Victory won't wait. It needs planes of all kinds at wartime speed. Day by day, the planes Fairchild is building are being produced 'just a little faster.'

When war broke out, Fairchild called in scores of sub-contractors in order to compress a month's ordinary production of parts into a day. A record for assembling the tools and putting men to work—as attested by the Army-Navy "E" flying over its plants today.

Production shortcuts clip minutes from hours . . . and put planes into pilot hands just that much sooner. No time to wait for a stretching die made of steel. Fairchild makes it of wood, saving much time, much steel. Special machines are designed for complicated forming operations once thought impossible to execute except by hand . . . and highly skilled mechanics are thereby freed to join the production battle at another spot. A machine is built that cuts down milling time on one part by 500 per cent. Still another machine is built which shapes a fitting so ingeniously that many hours-per-plane are saved in its installation.

And so it goes—a minute clipped here, an hour there. Time-saving ideas from Fairchild employees have helped put more than one additional pilot over Rabaul, Tunis, Hamburg.

Faster and faster roll the planes from Fairchild production lines. They must roll still faster . . . and they shall. For production, as well as performance, is behind "the touch of tomorrow in the planes of today."

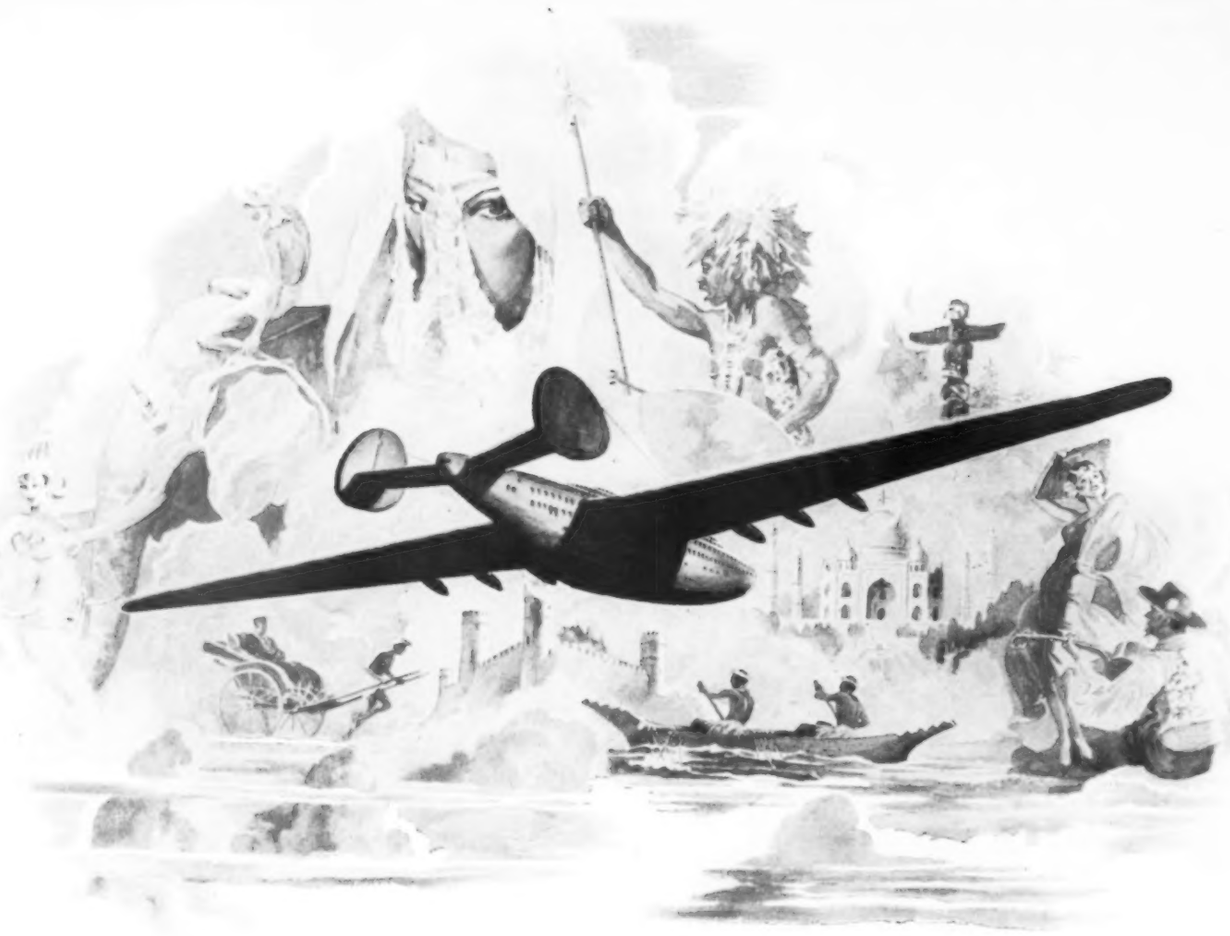
**"ON THE BEAM"**

*"The independence and liberty you possess are the work of joint councils and joint efforts, of common dangers, sufferings, and successes."*

*—Geo. Washington's Farewell Address*

Buy U. S. War Bonds and Stamps!

**Fairchild Aircraft** *Division of Fairchild Engine and Airplane Corp., Hagerstown, Md.*



# Tomorrow

## THE WORLD IS YOURS!

LONDON, overnight . . . Rio, over the week-end . . . Australia and back in a week. Tomorrow, by air, the world is yours!

Now, Martin aircraft are fighting on every front and are speeding the instruments of war to the four corners of the globe. After Victory, those lifelines will become airlines.

Already on Martin drawing boards lie plans for giant airliners of 125 tons, capable of carrying scores of passengers, tons of freight, to the farthest of horizons. Other Martin ships of 250 tons and more are in the planning stage.

These Martin planes of tomorrow will be the product of no one man, one group or one department. They are coming from the effort of thousands of Martin workers. The man or woman who shows why a rivet should be moved, makes as definite a contribution as the engineer who designs a new wing.

Only by complete cooperation from each aircraft worker, all along the line, are great aircraft built. And it is this over-all refusal to be satisfied, this universal desire to produce something better, which makes American aviation feared in war and ready for peace.

The Glenn L. Martin Company,
Baltimore, Maryland, U. S. A.

*Member:* AIRCRAFT WAR PRODUCTION COUNCIL, EAST COAST, INC.

**Martin**
**AIRCRAFT**

*Builders of Dependable Aircraft Since 1909*

## "YEP! THE SHANGRI-LA EXPRESS IS EARLY AGAIN!"

In the tomorrow that is nearly today, the stranger from Shangri-La who steps off the noon flier will create no more excitement for the local philosopher than strangers who used to come in on the daily milk train. Like as not he will have been to Shangri-La himself.

PRESIDENT

# BRANIFF *Airways*

Chicago, Kansas City, Wichita, Oklahoma City, Dallas, Ft. Worth, Houston, Amarillo, Wichita Falls, Austin, San Antonio, Laredo, Corpus Christi, Brownsville, Denver, Pueblo, Colorado Springs.

# JUST AMONG OURSELVES ★ *Editorials and Comment*

## Air Power Faces Another Crisis

ANOTHER all-out, name-calling fight over air power and its recognition is about to make its appearance. This one will be due to the fall of Pantelleria to air power, the inevitable success by air power against Sicily and Sardinia, the mounting damage inflicted by air power against Germany's homeland, and last but in no way least, the release of Walt Disney's picturization of Alexander P. de Seversky's book, *Victory Through Air Power*. Underlying the whole issue will be the burning argument over a separate air force.

But this time let us be more considerate of facts. By now there should be a competent public understanding of aviation. It may even be possible that the White House will climb down from the admiral's deck and offer air-minded counsel.

This time let's go over the actual war accomplishments of aviation. Air power has been rationed to umpteen fronts, it is true. But in a few cases it has succeeded in reaching full stride.

There are many facts which can be used, rather than theories. For example, nobody could prove before the war that air transport could move troops and supplies to the front in adequate numbers for decisive action. But the lesson of the Papuan campaign can now be cited, for that's exactly how General MacArthur's troops and supplies got to the front. The facts, as cited by Major Ray Vandiver, spokesman for the Troop Carrier Command which performed this unprecedented feat, are that an entire division of troops was flown from Australia to the Buna area. The average day's load was 500,000 pounds. Many of the planes landed right under the nose of the Japs, using soggy, unimproved fields.

There was proof in peacetime field tests, but the accuracy of daylight bombers was overlooked by influential American and British authorities until the Eighth Air Force finally got into action. For a long time false prophets of aviation raved about the necessity of fighter escort for heavy bombers. But today the record shows our bombsights have performed exactly as promised by those who knew the facts, that heavy bombers designed for long range were also equipped to go without fighter escort. And the facts, at long last, have proved ridiculous those critics who clamored for Uncle Sam to redesign our Flying Fortresses and Liberators to make them suitable for night bombing.

It has taken a lot of blood and sweat to quiet some of the critics. We've talked to some of the boys who did the bleeding, and they're not in the mood to argue longer against crackpots. They know better than anyone what the airplane can do for victory. But they can't understand why the airplane remains handicapped by the indecision of Washington to allow air power its rightful place among the arms of the nation.

Personally, we think they are unwise and unrealistic who say air power alone can't defeat Germany—unwise because no mortal on earth knows the full potentialities of air power; unrealistic because such a view completely disregards the reasons for Pantelleria's surrender to air power. That island's command didn't give up because of fear of bursting bombs. It realized quite logically that while air superiority hammered it ceaselessly, the same air superiority had shut off further supplies from the homeland. Bombs not only destroyed the command's resources on the spot, but prevented their replenishment and walled off all avenues of escape to those who would flee. The victory for air power was as complete at Pantelleria as it was against the Jap invasion fleet in the Bismarck Sea.

But who can say air power alone *can* defeat Germany? The truth is that nobody knows for sure, and the interests of aviation will be best served by those recognizing this truth. We do know, as a matter of fact, that thousands upon thousands of tons of bombs have been dropped on Germany. We know from photographs that a tremendous portion of this tonnage struck its mark. We do know that coupled with this destruction of German industry has been the significant reduction of German land, sea and air transport.

What we do not know is exactly how many planes, tanks and guns our bombs have destroyed *on the ground* in German factories and at German supply and operational bases. If we could tally these losses, guesswork would be removed.

But there is another way of judging the impact of our air strength against the Prussians. Their general staff and its hundreds of branch units are credited with remarkable efficiency in planning military ventures. Those who have developed war-making into such a precise art have labored endlessly for years in perfecting their plan of conquest. For every move, it is said, the Germans must have a "plan," G-2'ed to the Nth degree. The blueprint they devised for Munich was one Prussian plan which worked like a charm, for Germany won its initial victory not only by air power alone but by the *mere threat* of bombing. To pull that one off, the Germans had to convince themselves that air power was capable of great accomplishments. They possessed armored forces and motorized infantry divisions, yes. But it wasn't the ground army England feared at Munich—it was the *Luftwaffe*. When capitulation came on schedule at Munich, Germany's confidence in air power must have soared beyond reason.

Now, with American and British heavy bombers — far more destructive than Goering's little dive bombers—blasting city after city, factory after factory, will it be necessary for us to persuade Germany to realize what air power means? Of course not. Germany is fully aware of what the future holds, with American and British air power becoming stronger by the hour. Germany has played air power for all its worth. German staffs can chart future damage from air bombardment more realistically than ever before. If worship of Prussian militarism teaches them anything, it emphasizes the futility of fighting along faraway coasts while their war industries at home are systematically reduced to ashes and ruin. Their despair, meanwhile, must be heightened by the conviction that for once they have been outsmarted at their own game. Masters for a time on land, they turn out to be dupes in the air—with the fighters and small-calibre bombers they selected over heavy bombers strangely impotent now that the crisis appears.

Who can say air power will not defeat Germany?

This is not the time for harrangue and wild prophecy. Let the Army and Navy cease their row over intangibles and tradition.

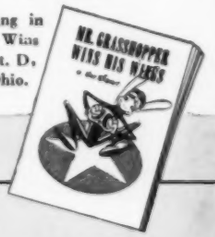
The vital question for Washington to answer is the one put to us recently in a personal letter from a famous airman who commands one of our most victorious air units. He asks, "when is America going to tire of *fighting* the war and start *winning* it?"

# THEY'RE GRASSHOPPERS—B'GAWD!

**Abel Grasshopper . . .** reporting for duty, sir! Able to climb quickly from restricted space . . . . . able to land anywhere—ready and willing to do any tough chore the Army may assign.

War or Peace . . . when anything new takes place in lightplane progress, expect it to start with Aeronca . . . that's why Grasshoppers were born! ☆ ☆ ☆ Just a short time before America's official entry into the war, the Army decided to experiment with light planes under actual combat conditions . . . take-offs from small, bumpy fields . . . landings in congested areas . . . sometimes a country road . . . often just a common cow pasture . . . all kinds of weather . . . and constant alerts both day and night. ☆ ☆ ☆ And the easily handled Aeroncas came through all gruelling tests with such a record for dependability, that today, satisfied Air Corps Personnel allocate them for pre-glider training, liaison work with troops afield, artillery operations, and various other assignments for which their maneuverability and control qualify them. ☆ ☆ ☆ Officially designated as the Army's L-3-C . . . a keen-minded brass hat, after seeing them perform, promptly dubbed them "Grasshoppers" . . . We emphasize with modest pride this apt appreciation of Aeronca "First and Finest." Aeronca Aircraft Corporation, Middletown, O.

A full-color book to delight the young in heart . . . Walt Disney's "Mr. Grasshopper Wins His Wings". Send 10¢ in stamps to Dept. D, Aeronca Aircraft Corp., Middletown, Ohio.



# AERONCA

FIRST *Grasshopper* FINEST

© 1943—Aeronca Aircraft Corporation

This advertisement is one of a series which will appear in national magazines and newspapers this year as Consolidated's contribution toward a clearer public understanding of "aviation geography."

# CONSOLIDATED VULTEE AIRCRAFT

# Try to Find a Spot that's more than 60 Hours from Your Local Airport!

No matter where you look on a globe today, you won't find a spot *anywhere* that can't be reached in 60 hours' flying time from your local airport!

Perhaps you hadn't realized that the world had become so small. Many Americans didn't . . . until it was almost too late.

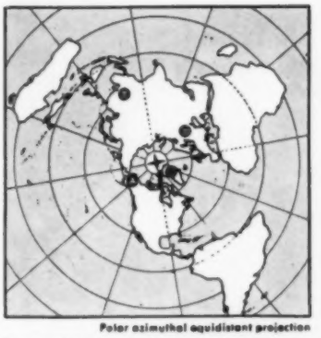
They thought of the earth in terms of vast distances and natural protective barriers. They believed that a country "isolated" by two oceans thousands of miles wide, had little to fear.

We had made the mistake of looking at maps in terms of *rowboat* geography. We learned our mistake when the Axis took our own invention, the airplane, and taught us the grim fundamentals of *aviation* geography – first over Britain, then at Crete, and finally at Pearl Harbor.

Now we know that to win this global war and build a lasting peace, we must revise our geographical thinking. We are looking at our maps more intelligently, and we are drawing *new* maps which show us global geography more clearly. These new maps have shadows on them, cast by wings. And they show us the world as it really is, because of the plane – a clustering of Air-age nations which must forever more be close friends or close enemies.

To survive as a nation and to live in peace in such a world, we must completely understand the simple and important truths which our new maps so plainly tell us. This means we must *restudy* geography.

For only then can we fully understand why supremacy in the air is a "must" for America, both for winning the war and for securing the peace that will follow.



Polar azimuthal equidistant projection

**On a global projection** *of the earth, we see the nations in their true relationship. Alaska (A) is merely a way station on the route to Chungking (B) – and Greenland (C) an easy stopover on the flight to Moscow (D).*

Orthographic projection

**No longer** *can we think of Europe, Russia, or even China as remote bodies of land on "the other side" of the world.*

**One day last year,** *a Liberator bomber flew to London in 400 minutes. On that day, the Atlantic was no longer an ocean, but a millpond. Even this amazing record was beaten several weeks ago when another Liberator hopped across the "pond" in 372 minutes!*

## QUICK FACTS FOR AIR-MINDED READERS

Planes designed and built by Consolidated Vultee cover the entire range, from military basic trainers and light observation planes to the largest long-range bombers and transport planes.

• • •

**The Consolidated Vultee Liberator bomber has the greatest speed, bomb capacity, and flying range of any American 4-engine bomber now in mass production. It has a range of 4000 miles and a service ceiling of 35,000 feet.**

• • •

When Anthony Eden visited the U. S. recently, he flew over from London in the "Commando" – the same Liberator bomber in which Winston Churchill flew to Moscow and, later, to Casablanca and Turkey.

• • •

**FREE:** Consolidated Vultee is eager to make whatever contribution it can toward a clearer understanding of today's new global geography.

The well-known cartographer, Richard Edes Harrison, has worked with us in the preparation of a 32-page booklet entitled "MAPS–and how to understand them." This booklet is now available and will gladly be sent free on request. Simply fill out the coupon below.

**CONSOLIDATED VULTEE AIRCRAFT CORPORATION**

**San Diego, Cal. • Vultee Field, Cal. Fort Worth, Texas • New Orleans, La. Nashville, Tenn. • Wayne, Mich. • Allentown, Pa. Tucson, Ariz. • Elizabeth City, N. C. Louisville, Ky. • Miami, Fla.**

***Member, Aircraft War Production Council***

Consolidated Vultee Aircraft Corp.
P. O. Box 157, New York, N. Y.

Please send me a free copy of the 32-page booklet, "MAPS – and how to understand them."

Name_____

Address_____

_____

***LIBERATOR 4-engine bomber — CORONADO and CATALINA, patrol bombers — P4Y anti-submarine bomber — LIBERATOR EXPRESS 4-engine transport — VALIANT basic trainer — VENGEANCE dive bomber — SENTINEL "Flying Jeep" — RELIANT navigational trainer***

They're coming,
Tojo!
BREWSTER BLASTERS
▸ on the Line
▸ on the Deck
▸ in the Fight
▸ in QUANTITY
Brewster
BUCCANEER AND BERMUDA DIVE BOMBERS • NAVY CORSAIR FIGHTERS

**31- Orientation**

**0.** Purpose of CAP Orientation Courses is to familiarize CAP personnel with the organization of CAP, the armed forces, and co-operating public agencies.

1. **Civil Air Patrol** Credit 2 hours Texts: "Facts about CAP", "Facts about CAP TRAINING", CAP Rules.

1 Each recruit at an early stage will be instructed as to the organization and activities of CAP and the unit to which he is assigned, the obligations of a member, CAP Rules, the training program, how officers and non-coms are appointed, the main operations of CAP, and how members may qualify for operations duty.

2 Each member will learn the correct name of his unit and the name and title of the commander of his unit and of all higher units in the chain of command to the National Commander.

2. **Army** 3 hours Text: CAP Training Manual No. 1.

1 Purpose is to familiarize CAP personnel with the organization of the Army of the United States so CAP may be prepared for effective service as an auxiliary to the armed forces.

2 In addition to individual study of the text, there will be 3 classroom instruction periods of 1 hour each, including lectures, general discussions, questions, and unclassified information on nearby Army units and facilities.

3. **Navy** 2 hours Text: CAP Training Manual No. 2

1 Purpose and instruction method as in (31-2)

4. **Army Air Forces** 2 hours Text: CAP Training Manual No. 3

1 Purpose and instruction method as in (31-2)

5. **Co-operating Public Agencies** 1 hour Text: CAP Training Manual 31-5.

1 Familiarize personnel with the public agencies with which CAP co-operates. Emphasize those in the CAP unit area.

6. **History of Aviation** 2 hours Text: Any standard text book prescribed by the unit Training Officer.

1 Give general background as to the main events and personalities of aviation with emphasis on the United States. Use pictures of planes and people.

**32- Military**

0. The privilege of wearing the uniform of the Army of the United States places upon every member the obligation to become well grounded in military customs and procedures so as to walk with a soldierly bearing, drill smartly in military formations, and conduct all activities with military precision. The success of CAP missions, whether in co-operation with the armed forces or separately, depends largely upon the thorough military training of each CAP member.

1. **Courtesy and Discipline** 3 hours Text: War Dept. Basic Field Manual FM 21-50 "Military Courtesy and Discipline" GPO 10c.

1 Teamwork under discipline is the prime essential of military operations. Recruits will be immediately instructed in this subject.

2 Instruction as in (31-2) plus frequent reviews and continual coaching.





**1 PERSONNEL**

**10- Status**

0. All CAP personnel, other than National Officers and civilian employes, will be civilian volunteers. The term "member" means one holding a currently valid CAP identification card (14) and does not include other CAP personnel who are provisional members (12), inactive members (15), or CAP Cadets (91).

1. All applicants for membership will sign the following oath: "I hereby make application for enlistment in the Civil Air Patrol and do solemnly swear (or affirm) that I will bear true faith and allegiance to the United States of America, that I will serve them honestly and faithfully against all their enemies whomsoever, and that I will obey the orders of the President of the United States and the orders of the officers appointed over me."

2. Enlistments in CAP will be for the duration of the war plus six months. During this period, all who take the CAP oath will be subject to it unless sooner discharged from CAP or on active duty in the armed forces of the United States.

3. The activities of CAP will be conducted by the members without pay or reimbursement for expenses, except for certain operations wherein members may receive a diem for expenses and rental for their equipment. Service in the Wings will be arranged to fit the spare time of members insofar as possible but members will be required to attend all meetings and mobilizations ordered by the officers over them and no one will be excused from punctual attendance without a reason acceptable to the unit commander.

4. A member may be ordered to CAP operations duty, but the usual policy, except in emergency, will be to permit him to apply for assignment and require him to serve on such duty only for the period pledged in his application. On assignment, the member will sign before a notary the following oath:

"I, a member of Civil Air Patrol, an agency of the United States of America, having been assigned to active duty with Civil Air Patrol, hereby voluntarily enlist subject to any and all orders of the National Commander of Civil Air Patrol to a term of continuous active service for the term of .....months, commencing....., 194....., and I hereby agree to be available for duty continuously and at all times during said term.

"During said term and any extension thereof, I do solemnly swear I will bear true faith and allegiance to the United States of America; that I will serve them honestly and faithfully against all their enemies whomsoever; that I will fully and faithfully perform all duties assigned to me and obey the orders of the President of the United States and the orders of the officers appointed over me subject to the Rules and Articles of War.

"In the event that I shall not report or be available for active duty at any time during said term or any extension thereof which I shall voluntarily undertake, or if I shall not faithfully and fully perform all duties assigned to me, I hereby consent to the revocation and cancellation of my license to own, operate, and service any aviation and radio equipment."

5. By order of the War Department, CAP members are permitted to wear the Army uniform, with certain distinguishing features. Appointments and titles of function and rank are in CAP and not in the Army. The prescribed CAP emblem bearing the letters "US" is registered internationally. A member in CAP uniform captured by the enemy will be on the status of a prisoner of war.



8-81

**11- Eligibility**

0. Men and women who are citizens of the United States, native-born or naturalized for a minimum of ten years from countries other than enemy nations or those occupied by the enemy, are eligible for membership in CAP. Minimum age is sixteen. It is recommended that an applicant under eighteen be enlisted as a Cadet rather than as a member unless he holds a CAA student pilot certificate. No maximum age or physical requirement is prescribed. Active or reserve personnel of the armed forces or State guards, other than National Officers of CAP, will not be admitted as CAP members except by order of the National Commander but may receive CAP training on the same basis as provisional members without applying for membership.

**12- Application**

0. Membership application will be on prescribed forms secured from the headquarters of the local Squadron or Detached Flight.

1 The applicant will fill in all blanks in the application and fingerprint card; execute a full set of clear fingerprints on the card; furnish three full-face passport photos, 1½" x 1½", without hat, unsmiling; and deliver without folding to the local CAP unit. Incomplete or illegible applications will not be accepted.

2 An applicant under twenty-one will attach a letter from parent or guardian consenting to the applicant's service in CAP.

2. The unit commander will transmit these items, without folding, directly to National Headquarters after signing "Approved," with his full name, CAP title, and serial number, CAP unit name, and address, on the back of the application which will not be considered without this endorsement. He will not sign unless he believes the applicant possesses qualifications useful to CAP and will make an industrious and desirable member.

3. Members of a typical unit will be about a third pilots; one-third student pilots; and the rest with auxiliary skills in radio, photography, medicine, and other ground duties. This ratio is not mandatory and will be impossible in areas where pilots are few or where a large ground personnel is needed for duties of the local unit. But the above ratio and the prescribed tables of organization for units will be borne in mind in the endorsement of applicants.

4. After endorsing an applicant, the unit commander will admit him to training as a provisional member of the unit in which status he will not wear the CAP uniform or insignia. He will be excluded from assemblies where he may gain confidential information. He will not participate in CAP operations except by order of the National Commander or in temporary emergency but will be subject to command and discipline pursuant to the CAP oath. He will attain membership in CAP only after completion of training prescribed in (17).

**13- Investigation**

0. No one will be admitted to membership without careful investigation of his character, loyalty, ability, and the truth of statements in his application.

1. The unit commander who endorses the application will ascertain that the pictures, fingerprints, and signature are those of the applicant. He will read the application and check any portions of it that may seem doubtful.





## 3 TRAINING

**30- General**

0. The purpose of CAP training is to prepare all personnel for duties in CAP and develop their skills under military discipline for other war services. It is required that flying personnel become familiar with auxiliary ground duties and that ground personnel learn the fundamentals of aviation.

1. Each unit commander will be responsible, through his Training Officer, for a continuous program of training so recruits will learn the primary subjects rapidly and in orderly progression and members will be working at all times on interesting study, classroom, and practice exercises without unnecessary repetition of courses and without lost motion.

2. Each unit will meet not less than once a week for training not less than 2 hours and will hold additional meetings averaging not less than 2 hours a week for practice missions which will be outdoors when weather permits. Additional meetings may be ordered by the unit commander. Special training meetings will be arranged as necessary for members unable to attend regular meetings by reason of war work, illness, or distance from the meeting place. Members may meet at will with instructors.

3. The number of credit hours prescribed for each training subject is the minimum of instruction by CAP instructors (30-5) before credit is given. Many subjects will require much longer study, with subsequent refresher courses, quizzes, and practice exercises to be sure that skill and knowledge are retained.

1 Each member will be required to complete a minimum average of 5 credit hours per month.

2 Credit for a course will be given on completion of the prescribed number of instruction hours and written or oral examination or both. No fractional credits will be given for parts of courses. Members will be examined from time to time by boards of officers on all subjects they have completed (17). Members with prior experience may be credited with courses on which they can pass examination. Credit for courses learned through home study may be allowed on satisfactory examination for members unable to attend meetings, but the needs of such members will be met through special meetings (30-2) insofar as possible. No credit will be given unless the member has thoroughly learned the prescribed subject matter under standards not less than those for CAA private pilot examinations.

4. In addition to prescribed courses, each unit will conduct practice missions (41) for all personnel to simulate CAP operations and missions that the unit may perform in local emergencies. Policy will be to encourage flying personnel to advance their aeronautical ratings and help ground personnel learn to fly.

5. Instructors will be designated by the Training Officer from members and experts from outside CAP best qualified to teach the CAP courses. Each local unit will maintain a list of instructors approved to teach the respective courses. Training films and special equipment will be used when available.

6. Texts for training courses will be supplied where possible by National Headquarters. Usual distribution will be 4 copies per headquarters. A limited number of extra copies may be furnished to unit Supply Officers on request through channels. Some texts, identified by "GPO" in the following, can be purchased from Superintendent of Documents, Government Printing Office, Washington, D. C., for the prices specified with 25 per cent discount for quantities of 100 or more.



18-b

# Whatever the shape of Planes to come

Perhaps the post-war private plane will be a refinement of today's models . . . or it may be one of the new designs . . . the helicopter, the flying wing, or a roadable, folding-wing ship. But whatever the shape of planes to come, many of them will be powered *exclusively* by Franklin aircraft engines. Already leading airplane manufacturers realize that construction economy and satisfactory flight characteristics are best obtained by standardizing on one make and model of engine. Franklin engines are the logical choice for such standardization, because of their proved economy and reliability, and wide range of models from 65 to 500 H.P. Today's Franklins are the culmination of 43 years' experience in producing air-cooled power.

AIRCOOLED MOTORS CORP., SYRACUSE, N. Y.

Franklin

FINE AIRCRAFT ENGINES

**Currently, Aircooled Motors Corporation's entire facilities are devoted to the design and production of Franklin warplane engines for military and naval use.**

Buy War Bonds and Stamps

# Another Fortress Is Hatched

A mammoth door is raised. Without fanfare, another Boeing Fortress is rolled out—ready to fly!

Looming huge and mysterious in the half-twilight, the Fortress beneath its trim, classic lines sheathes interior structures and installations that are both durable and complex.

Despite the many difficulties entailed in building so complicated a weapon, Boeing is able to hatch out Flying Fortresses* in constantly accelerating volume, because it has reduced even the most involved procedures to simple, accurate operations which can be learned quickly. This means manufacturing planning of the highest order.

Each part, each function, each assembly (and they total thousands) had to be arranged and tooled. Boeing, for example, developed more than 100,000 *special* tools to do the job.

One result is that Boeing's output is the greatest of any aircraft manufacturer —per man, per machine, per unit of floor space. Today, Boeing is building Flying Fortresses at a rate *eight times greater* than the month before Pearl Harbor.

Further, the results of Boeing's planning are, in turn, helping other companies to speed up America's aircraft production. For, under the BDV agreement, Boeing has made its plans and specifications available to both Douglas and Vega which also build Boeing Flying Fortresses.

• • •

*Once peace is won, you can look to Boeing's research, design, engineering and manufacturing genius to bring you many a new and interesting product . . . with the sure knowledge that if it's "Built by Boeing" it's bound to be good.*

DESIGNERS OF THE FLYING FORTRESS • THE STRATOLINER • PAN AMERICAN CLIPPERS **BOEING**

*THE TERMS "FLYING FORTRESS" AND "STRATOLINER" ARE REGISTERED BOEING TRADE-MARKS

# *Charge of a* "COMMANDO"

## Giant transport takes off on *AEROLS**

Capable of carrying jeeps and light artillery, as well as paratroops, Curtiss-Wright's "Commandos", used by the Army Air Force, are destined for a vital role in today's lightning warfare.

Equipped with Aerols, these huge, heavily laden transport planes sweep away to swift, sure take-offs. And their landings are feather light, for Aerols effectively cushion all landing shocks.

Today, Aerols are providing performance of this quality not only on "Commandos", but on *every* type of military aircraft. Such service forecasts their importance to the future safety and comfort of travel by air.

**THE CLEVELAND PNEUMATIC TOOL COMPANY**
***AIRCRAFT DIVISION*** • • **CLEVELAND, OHIO**

***Also Manufacturers of*** **Cleco pneumatic tools for the aircraft and general industry, Cleco sheetholders, Cle-Air shock absorbers for trucks and buses, and Cleveland rock drills for mining and construction work.**

# AEROLS*

*THE SHOCK ABSORBING UNITS ON AN AIRPLANE'S LANDING GEAR; THE NAME IS DERIVED FROM THE WORDS "AIR" AND "OIL"—THE FLUIDS USED TO DISSIPATE THE LANDING SHOCKS

# EFFICIENCY IN TRANSPORT...

with

## JACOBS AIRCRAFT Engines

The Army Air Forces use the most efficient airplane for each specific purpose in Transport, as well as for their Combat missions. Huge cargo planes carry large groups of men and tons of equipment and supplies. But, for the rapid transportation of officers over distances up to 1000 miles, the Army has selected the Jacobs-powered C-78, light Personnel Transport,—swift, reliable and economical.

JACOBS AIRCRAFT ENGINE CO.

POTTSTOWN · PENNSYLVANIA · U · S · A ·

# A CARRIAGE FOR THE *Queen*

There's an old and still unchallenged saying among soldiers that "the infantry is the queen of battle." But queens, like everyone else, are changing their ways these days and now *the queen* has a carriage . . . a troop-carrying glider . . . for the swift, surprise calls behind the enemy's lines.

This *carriage for the queen* was designed by WACO . . . is now being manufactured by WACO and more than a dozen other plane builders using WACO's design and engineering supervision.

As more and more of our troops move into battle, you can depend on it that *the queen* will be making plenty of these unheralded visits behind the lines . . . and you can also depend on it that there will be plenty of WACO gliders on hand to furnish the transportation.

*The Waco CG-4A, 15-place glider is now officially known as the "Haig."*

WACO AIRPLANES

THE WACO AIRCRAFT COMPANY • TROY, OHIO • U. S. A.

This striking water color, showing a Civil Air Patrol pilot far at sea, radioing for help for stricken crews while circling their torpedoed freighter and their assailant, is the work of K. O. Heist of Cleveland. The original was recently presented to Lt. Col. Earle Johnson, CAP commander, by the Weatherhead Company of Cleveland, for which the picture was painted by Mr. Heist.

# Civil Aviation's War Against The U-Boats

THE Civil Air Patrol's organization of 75,000 volunteers, operating out of a thousand airports, constitutes the world's largest aerial home guard, and has more planes available for assignment today than the entire Army Air Corps possessed in 1940. It has been credited with flights totaling over 20,000,000 miles, the spotting of more than 150 enemy submarines for the Army, Navy and Coast Guard, the sinking of an undisclosed number of enemy U-boats, and off-shore patrol missions which saved the lives, by rescue and by frightening away enemy subs, of hundreds of merchant seamen.

The Office of War Information last month singled out the "Flying Minute Men" of the CAP for recognition, releasing many details concerning CAP Coastal Patrol.

Only the United States and Russia have allowed their civilians to fly in wartime; other belligerents grounded their amateurs as soon as war was declared.

Many American military authorities doubted in the early days of the war that civilian flyers could render any real service. But aviation enthusiasts immediately began showing what they could do. They had considerable resources to work with, for there were at that time in the United States 100,000 civilian pilots, a number of student pilots, 25,000 private planes, and more than 2,000 civilian fields. Most of the military-age pilots and students were soon in the armed services; CAP began organizing the rest into volunteer squadrons, groups and flights serving under a Wing Commander in each of the forty-eight

**Aerial frontiersmen, they taught themselves to fly and fight. In their own planes and from bases of their own creation, they joined the war against the U-Boats. Here's their record, a tribute to civilian valor.**

Coastal Patrol insignia, drawn by Cartoonist Zack Mosley, shows CAP's putt-putt struggling over the Atlantic Ocean with its lethal but burdensome load.

**COMMANDER JOHNSON VISITS CAP WINGS** in the forty-eight states often. He's shown here at a recent Oklahoma mobilization, pinning wings to the uniform of an active Flying Minute Man. The Colonel is an Army Air Forces officer; men and women under his command are all civilians, but the CAP operates under the War Department as an auxiliary to the Air Forces.

states. Wing Commanders report directly to National Headquarters, staffed by officers of the Army Air Force, at 500 Fifth Avenue, New York City.

### Aviation's Melting Pot

Mechanics, nurses, radio operators, observers, photographers and doctors joined the pilots in ground-crew training which fits each local unit to perform any mission light planes can fly. The inland squadron members carry on their regular jobs and serve in their spare time. Qualified members may volunteer for tours of full-time duty on CAP operations such as Coastal Patrol, where many have signed up for the duration.

Flying their own planes, using their own brains, initiative, equipment and money, together with gradually enlarged Federal grants, they have built up many coastal bases from Maine to Mexico.

Inland, their courier routes between Army posts and between industrial plants require the services of several hundred planes daily and a large number of pilots, ground mechanics, and radio operators. Their volunteer missions search for lost planes, maintain forest fire patrols, and fly emergency relief to flood and disaster areas. They furnish men and women pilots to the Transport Command, and carry on a large-scale training program—all of which frees thousands of Army planes and pilots for more urgent assignments.

Casualties to date among the CAP units are thirty flyers killed and seventy-three planes lost. One of those killed was a man of fifty; another a boy of nineteen. Nobody is deferred from the draft because of CAP membership. A number of pilots have physical disabilities, and there is a man, injured in the last war, now flying the Southern Liaison Patrol out of El Paso, Texas, who has two artificial legs.

At the outbreak of war, Lt. Col. Earle L. Johnson, the enthusiastic present Commander of the Civil Air Patrol, a pilot of fourteen years' standing, was alarmed at the unguarded state of airports and the ease with which a saboteur could steal a plane and dump explosives on a war plant. "It gave me the creeps to think what a hundred determined Germans could do to a hundred power plants in one night, land their planes in a field, walk away, and never be caught." The story has been told of his taking off one night in his own Curtiss-Wright and dropping a sandbag on a Cleveland factory. Following this, airports were placed under armed guard, all civilian pilots were required to prove citizenship and loyalty, and no planes were allowed off the ground without clearance.

### U-Boat Menace a Challenge

When packs of U-boats invaded the inshore water, CAP secured a grant of $18,000 for a trial CAP base near the worst ship graveyard on the Atlantic Coast. Submarines 245 feet long and mounting 4.1-inch guns were slaughtering our tanker fleet. There were no coastal convoys. Vice Admiral Adolphus Andrews, in command of the Eastern Sea Frontier, had only a handful of subchasers from the last war, five old Eagle boats, three ocean-going yachts, less than a dozen good Coast Guard ships and four blimps to cover a territory stretching 1,200 miles from Halifax to the Florida keys.

People stood on the beaches and watched the ships go down. There was a time in May when sinkings grew so terrible that all shipping was stopped until convoys could be organized. There was a time when tankermen considered it a feat to get by Cape Hatteras alive.

Civilians, remembering Dunkirk, clamored to help. The best the civilians could do was locate for the hard-pressed Navy the U-boats that were still surfacing in leisurely fashion and shelling tankers at point blank range. This the Civil Air Patrol volunteers in their little single-engine land planes did better than anybody else, and this they did to the limit of their capacity. Sometimes, when they fell into the sea, they were doing more than they could. But others took their places.

To the first volunteer bases at Atlantic City, New Jersey, and Rehobeth, Delaware, hurried complete CAP units with their own planes, two-way radio equipment and operators, mechanics,

**THIS MILITARY TENT BASE** was headquarters of the Missouri Wing of the Civil Air Patrol during recent mobilization. Over 400 members participated in maneuvers, training for any eventuality. They recently performed extraordinary service during the Midwestern floods. Missouri CAP flyers are also engaged in Coastal Patrol.

and medical personnel. Maintaining radio communication with ships and the shore, they spotted submarines from the very start.

It was unorthodox for Stinson and Wacos and Fairchilds to skim eighty and 100 miles out to sea patroling at altitudes as low as 300 feet. If one sparkplug began to miss, the pilot and his observer were in danger; if the engine went dead, the best they could hope for was a pancake landing on a wave crest. Twenty-four men have subsequently been lost this way. But in spite of the known hazards, retired lawyers, youths in their teens, carpenters and barnstormers asked to serve, and did.

Army, Navy and Coast Guard pilots called them "The Flying Minute Men," and tanker crews ploughing up the coast cheered and waved their caps to see the single-engine putt-putts circling overhead.

### They Made Their Own Way

Pilots, plane owners, mechanics and other aviation enthusiasts not only volunteered their time and equipment. They also dug up their own expenses for store-bought khaki uniforms and the thousand-and-one items necessary for air operations. Wealthy CAP'ers put up large amounts of expense money to enable others to contribute their skill. The Virginia General Assembly appropriated $5,400. A North Carolina base was started by twenty squadrons contributing about $100 each. A group of Middlewest mechanics raised enough money for one of their number to quit his job and serve on the coast a couple of months. Fifteen thousand dollars raised by passing the hat in Detroit financed a trailer kitchen and operations office on wheels and other essentials, including a radio transmitter.

Almost everything in the line of equipment was short at the hurriedly organized CAP bases. While A. & E. mechanics were signed up as members, the country was scoured by sharp-eyed pilots for parts. The collection of airplanes was a motley one, and the variety of parts and equipment was even more so.

The eight dollars per day remuneration for pilots hardly covered expenses for uniforms, food and lodging, depreciation and maintenance. Captain Robert E. Thomas, a Baltimore broker, figured after flying 40,000 miles on a six-month tour of active duty that he had $56 left when all expenses had been paid. Often Capt. Thomas and hundreds of others had to pay their own way when their pay and expense money was not forthcoming. But they managed to get by, on credit or with loans, until the tardy checks showed up, sometimes by special air courier from Washington.

"Getting by" became a characteristic of the CAP. Their coastal bases were not elaborately-engineered or equipped with lights, hard runways, radio beams, costly refueling systems and the like. A Maine crew which had rebuilt its base from hand-cut timber rescued a Navy flier from the sea, flying the mission without a lighted field for take-off and landing. The putt-putts were fueled from cans on some bases, there being no pumps. A regulation requiring life preservers for patrol flights prevented a North Carolina base from over-water searches until one night the tide washed ashore seven dead Germans in lifebelts. The next morning the putt-putts took off—regulation style.

All CAP'ers wanted from the start to bomb, depth-charge or machine gun enemy subs. But their planes were not armed. Then the inevitable happened —one of the putt-putts found a U-boat close to shore and so confused the enemy skipper he rammed a mudbank. Circling, the CAP'ers could only radio frantically for aid. This went on for forty minutes, until the Germans, with the CAP plane helplessly circling, wiggled free from the mud and disappeared in deep water. Ingenuity got busy, and soon several anonymous technicians and an Army officer devised an assortment of bombsights made of hairpins, tin cans, mirrors and other scrap. Light racks for two demolition bombs were perfected, as was an attachment for depth charges, and the "Flying Minute Men" became bombers, accurate enough to swoop and hit a U-boat's conning tower. Their little improvised sub-chasers could barely struggle off the airport under the load of bombs, but, like Doolittle's Tokyo raiders, they perfected take-off technique to fit the need. Fifty submarines have since been chased from tankers; some—the total has not been released—have been sent to the bottom by the CAP.

An active-duty flyer described CAP personnel as follows:

"Most of the men who fly coastal patrol aren't youngsters. They're in their thirties, forties or fifties. They had to earn the cash to buy their flying time and it was against odds that they learned at all. If they had no aptitude, they didn't survive. It's only in recent years that well-equipped fields and beacons and radio and weather predictions have been so common. When I learned to fly, I used to drive in winter two and one-half hours to the flying field. The plane was standing there covered with snow that we had to sweep off. We'd take out all the sparkplugs and heat 'em on a stove. Then we'd spoon ether into the cylinders and work on the motor another hour to get 'er started—all for thirty minutes in the air. Those were the days! I remember one time up in the Alleghenies—"

Then follows a tale of trees, railroad tracks, telephone wires, failing motor, approaching storm, and a side-slip, last-minute landing just the other side of a stone wall between a barn and a ditch.

"It's a certain kind of freedom we're after. Those troubles along the coast—they're nothing new to us. We've been coping with stuff like that for years. We do it because we like it. It's fortunate, of course. Ask my wife about that."

### Hunting Subs in the Gulf

A representative CAP enthusiast is gray-haired Dr. W. B. Jamison, who runs a hospital in Saginaw, Michigan.

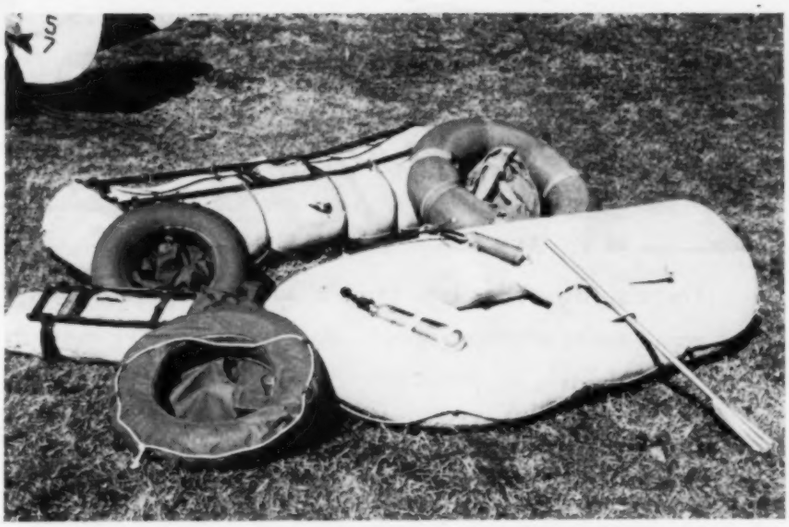
He flew his own Stinson 245-horsepower Reliant down to a field in Mississippi, in July, 1942, when the CAP patrols were opening up their war against U-boats in the Gulf of Mexico. It was lucky he was a surgeon, for one day he was called in from patrol to attend a woman plotting-board operator who had acute appendicitis. The immediate operation he performed saved the woman's life.

"We scoured the Gulf from dawn to dark," he said, "and had mighty few mishaps, considering the miles we flew and the ships we convoyed. But early one morning John Danmeyer, of Detroit, with Observer Billet, also of Detroit, was out beyond the islands to the eastward when their motor started to miss, and then conked out. At the base, on the two-way radio, we heard Billet saying, 'Now we're losing altitude, now we have 400 feet, now we have 200 feet, we're settling fast, now we have 100 feet, now we—' and the crash and gurgle of the water took over. They'd had a good look at Daupin Island and decided they could not make it, so they headed for a tanker and crashed as close to it as possible.

"John made a good landing, with the tail striking first and then the fuselage. But it was an old-type ship and when she struck the water it peeled the fabric right off the frame so she had no buoyancy and sank like a rock. Under water, Danmeyer couldn't find the door, so he broke out the windshield. Billet got mixed up in his safety belt and that delayed him a few seconds, but he made it out through the windshield and got to the surface, too.

"The tanker was a Norwegian, manned by good seamen. They lowered a boat and had the boys aboard it in twelve minutes.

"On patrol one time my observer, Mel Holderness, and I were a long way out when the rocker arm casting on No. one cylinder let go. We had only a hundred feet altitude, and it was bad. But the same thing had happened to me before in Pennsylvania and I knew something about nursing her along. We were headed out to sea, but we didn't dare turn for awhile, because turning takes a little extra power and we couldn't afford to lose an inch of height. It took us ten miles to climb to 400 feet and get headed for home. We felt better then, because we had height enough, if necessary, to veer into the wind and make a decent crash landing. From a hundred feet, you know, you just plop in head first and have no chance. We got over the islands and I said to Mel, 'Shall we make a landing on the beach or shall we try to get home?' 'We're doing all right,' said Mel. So we started across the twelve miles of water and got there okay. They kidded me at the base because I'd been saying on the radio, 'The motor is knocking rather badly.' "



**EMERGENCY GEAR CARRIED TO SEA** by CAP flyers includes rubber boats, Mae West jackets, inner tubes, fishing lines, and knives and other devices for protection against sharks and barracudas. Their small, single-engined airplanes are fragile, sink rapidly. Thirty of them have lost their lives to date—but their safety record is unusually high considering the millions of hours in the air the CAP has logged.

Said another Gulf pilot, "We were pretty sure subs were being fueled in the Gulf because we often saw oil drums floating or washed up on the beach, and once we surprised a tanker hove-to and acting suspiciously, which we reported to the Coast Guard. We kept an eye on a number of fishy-looking activities and had them stopped.

"We had no rubber lifesaving boat in the planes. We just had kapok Mae Wests and what we called flotation gear. This consisted of a big inner tube, truck size, with a canvas bag fixed in the middle. Inside this bag a man could sit or stand; the waves slopped in, but it held him up. The idea of the canvas bag was to keep the barracuda away. They have sharp teeth and a bad habit of taking off a finger or a toe or a bit of flesh here and there, and that brings the blood and that brings the sharks and then you're a goner. We each carried a shark knife on our belts, and we had a little bag in each flotation unit with a fishline, a canteen of water, a flashlight and about a day's food. I think we were the first people to carry fishlines. There were two of these floater affairs in each plane, one for the pilot and one for the observer, but, as a matter of fact in a crash the men were doing well if they could get themselves out before the plane sank. The chief use we found for our rubber rings was for an escort plane to drop them to the other fellows if they came up."

At a typical Atlantic coast base where volunteers nowadays sign on for the duration, cars with dimmed headlights move out from town to the airport at four in the morning. Since the base couldn't get help to run the canteen, wives of CAP members run it themselves, and there the morning pilots get their coffee and bacon and eggs. They climb into the neck opening of their great rubber "zoot suits," which are all one piece and have rubber boots and gloves attached . Though they fly in unheated planes, they have not been able to secure fleece-lined flying suits such as service pilots use. They strap on their Mae Wests fore and aft, check the carbon dioxide cartridge, make sure of their sheath-knives and the waterproof red flashlight attached to their collars. "It's some job," says a laughing observer, "to do your figuring for navigation, chart your course, and write notations of ships and their speed and course, all in two pairs of gloves."

"It's some job to read it, too," says the Commander.

They get their orders, cram themselves into the cabin, the motors roar and the little planes hop up into the dark sky and disappear straight east. Soon a glimmer of gray shows over the sea. The look-out on a tanker may be waving to them now.

*(Continued on page 60)*

# THE Sky's the Limit

BY BILL GREEN

There's too much red tape around airports . . . Cussing won't make airplanes go . . . Aviation will solve many transport problems . . . How my Culver compares with my car.

### Red Tape

One of the first things we want to do when the war is over is to get rid of all the folderol connected with flying airplanes off of airports. We refer especially to the clearance and arrival reports—damned nuisances, if there ever were such. Having to fill those things out accounts for at least fifteen minutes on each trip. Because of type personnel frequently employed for the purpose of supervising such matters, it often takes longer than that. Another thing that is a nuisance is the gasoline tax exemption forms.

Going into an airport, gassing up, signing all the forms, exhibiting all the identifications, getting a weather code sheet, etc., is as bad as entering most foreign countries. It *may* be necessary during wartime, but we certainly don't want it after the war.

★ ★ ★

### New Crop of Cussers

The other day we were watching a very young shavetail trying to start a couple of 2,000 h.p. Wasps on one of the big jobs. It would pop, backfire, poop, and quit. Finally he got one of them going and was more surprised than anyone. Then he tried the other one, but it didn't want to go. We could see him grinding away up there, cussing, calling that beautiful engine a lot of things it didn't deserve. He should be trying to start some of the junk that passes for engines that we private flyers have to use. Especially when they are 300 hours past their normal overhaul time. Anyway, finally this engine started with a full throated roar. It was marvelous to see the way the smile started around the corners of his mouth, and spread over his whole face. We think he was tremendously impressed that he got the thing going.

This brings us around to another thing—most people do not treat any kind of mechanical equipment very well. If they work at it routinely, provided they have studied it well, they may not do so bad, but when they get into an airplane just once in a while, they are likely not to keep the batteries charged, the gascolator cleaned out, and the oil and dirt cleaned off.

We were surprised a short time ago to find that most people had not the faintest idea about the life and operating conditions of a storage battery. There is a little booklet about batteries, comes with every airplane, and every automobile, when they are new. Reading those books you would discover the average storage battery such as is usually installed in private type aircraft may be discharged and charged up about fifty times. That means that if you charged the battery each night, and used it up during the day, that you would have to buy a new battery within sixty days. Thus, people might learn to respect their batteries, conserve their power, and try to reduce the number of charge-discharge cycles—that is, spread them out over as long a period of time as possible. Another important thing is to keep them filled with electrolyte—and add distilled water as often as is necessary.

A good habit, which will save batteries, and in some cases may save the whole engine, is to turn the prop over in reverse direction for a few turns—slowly, and then turn it over forward with throttle set properly for starting, and after priming—if priming is necessary. Then, when the starter is used, and the switch is on, the engine will usually start the first time over.

We saw a case the other day where a fellow ran an engine for three or four hours when he knew one of the valves was blowing. Result: the whole valve was ruined and the valve seat was burned down so badly the cylinder had to be sent back to the factory for overhaul.

We know of another case where a fellow went out and started an engine with a starter, when everyone knew that that particular engine sometimes had oil in the lower cylinders. Well, there isn't much clearance in those cylinders, and a bit of oil down there might be a little too much—it was in this case. Result, the whole motor was ruined. That would have been prevented by turning the engine backwards for a few turns, slowly, and permitting the oil to be pushed out, then turning it forward until you are sure there is no more oil in there.

★ ★ ★

### Transport Economy

Having a sincere desire to help the national war economy as much as possible, we have been studying the whole transportation problem, as it affects the average business man, whether he flies or not. We have concluded several things:

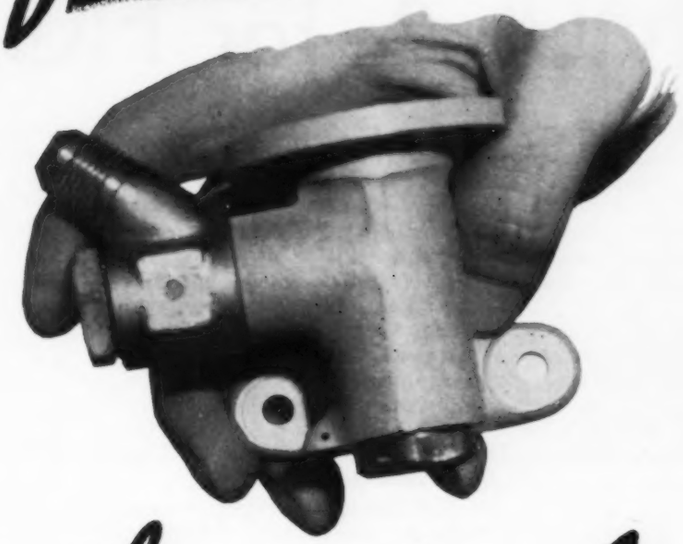
First, such is the nature of our national business structure that people are forced to travel a considerable amount. We know, of course, that a lot of trips *are* unnecessary. We know a lot of people go for reasons other than business. But we do know there are a multitude of large businesses in the country—with branches in most towns and cities. Someone has to visit the various branches. We know also that most buying and selling (markets) is done in a few widely scattered points. We know also that if you do any business you have to do business with government agencies—and they have a man for each and everything—those guys are scattered all over.

Second, all contractors, oil men, bridge builders, etc., have to have their headquarters one place — and work some other place (the nature of which is temporary. These fellows have to travel—it is unavoidable.

Third, our transport system is composed of four main types—all contributing to the general good. These

*(Continued on page 40)*

# For { *Want or failure* } of a vital part



# *the battle can be lost!*

**E.L.I.** Instruments and Services in use throughout the World are the result of research and manufacture to the most exacting precision requirements. As a natural outcome the vital aviation and other military equipment we are building to help the United Nations smash the Axis, must meet the same rigid precision standards for absolute dependability in quantities to prevent assembly line delays . . . . forecasting with the dawn of Victory many improvements and new E. L. I. Products for a brighter tomorrow.

## *Engineering Laboratories, Inc.*

CONSULTING ENGINEERS & MANUFACTURERS

**TULSA, OKLAHOMA U. S. A.**

EQUIPMENT IN WORLD-WIDE USE

By MAJOR AL WILLIAMS

**Here, as viewed by one of America's greatest airmen, are some of the reasons why Uncle Sam's fighter pilots are the world's best. They're alert in mind and body, thoroughly trained as marksmen and flyers, and eager for combat.**

# FORMULA for FIGHTERS

THOSE who have not seen the overall preparations for American air power, the thousands and thousands of planes in the air day and night, the unbelievable numbers of young pilots in training, and the network of gigantic airports throughout the land, have a reassuring surprise coming to them. The scope of the plans and the plants of the Air Corps have caused me to pinch myself to make sure it isn't a dream.

When one enters the busy life of an Air Corps post, hard realism permeates the entire day and night. What can you do in a cockpit? That's the yardstick of values in the Air Corps. All the rest is dismissed as counterfeit.

I am writing this from one of the greatest single-seater fighter training centers of the U. S. Army Air Corps. Around me I see nothing but bright, keen, alert, vigorous faces—healthy young Americans—all obsessed with one idea, to become the best fighter pilots in the world. There's no question but that the air forces have skimmed the cream of our young American manhood and fired them with determination.

The men at this fighter training field, the commanding officer, the instructors, the student pilots and the mechanics, constitute one great team. They have time and attention for nothing but flying and discussion of flying techniques, gunnery and maintenance of equipment. They all eat, sleep and drink aviation.

Military acrobatics, accuracy of flight control, precision of airmanship, all point toward one objective—gunnery markmanship. And they keep the program pointed in that direction. That makes hard sense.

★ ★ ★

### Pilots Must Be Marksmen

You duck shooters know what "leading" the target means and you know how much practice is required to learn how far you must aim ahead of the duck and shade the "lead" as the duck's line of flight is altered. The "duck" for the fighter pilot is an enemy fighter plane or bomber. The garden variety of duck flies about 50 or 60 miles an hour—but the fighter pilot's duck flies five or six times as fast. The fighter pilot's job is to learn how to aim his ship as the expert infantryman aims his rifle. The whole plane becomes a rifle.

The slightest error in aligning his ringsight with the target means he will shoot yards wide of the mark. The greatest problem in aerial gunnery with fixed guns is compensation (or lead). This must be calculated for the speed of the target and the angle at which the target plane is attacked. There's no time for slide rule or mathematical calculation. But there are certain basic rules for the efficient use of the ringsight, allowing for the time required for a projectile to travel a certain distance and the distance that will be traversed by the enemy plane during the same period.

The angle at which the attack is launched against the enemy plane also is one of the basic factors. For instance, when the enemy plane is flying at right angles to the line of fire from the attacking plane, the "lead" is greatest. And as the attacking angle is altered, the lead must be altered also. In addition, the speed of one's own ship and that of the enemy must be reckoned with. There are hundreds of tricks in this business of shooting with fixed guns mounted to the single-seater fighter plane.

You'd be amazed to learn the lead required to hit a modern airplane flying between 300 and 400 miles an hour at right angles to the marksman.

(Below) Maj. Gen. Barton K. Yount, commander of the AAF Flying Training Command, watches proudly as single-seater fighter students go through their routine high above. He and his staff are turning out combat airmen with almost incredible records for flying, marksmanship and safety.

(EDITOR'S NOTE: Major Williams recently completed a two-month tour of Army Air Force single-engined fighter pilot schools where, at the request of General Henry H. Arnold, he lectured on precision flying to students and demonstrated his points in his Grumman "Gulfhawk". Making the tour-in his own plane, at his own expense, without rank of any kind and without cost to the government, he covered about 12,000 miles, delivered about forty lectures to pilots, instructors and mechanics, gave one or more flight demonstrations at each school and took no time off from his mission throughout the two-month period. Major Williams is aviation manager of the Gulf Oil Corporation and aviation editor of the Scripps-Howard newspapers, which regularly publish his columns, from which this article was adapted.)

—Army Air Forces Photo.

Army fighter students peel off from formation to dive in for attack. Major Williams says they are so obsessed with their work that "this flying business must be a religion." He should know.

The lead is so great that one is inclined to believe, unless he has tried it, that the fighter pilot is determined to hit the open air an unbelievable distance ahead of the target. But it takes time for bullets to travel — and planes speed at the rate of 400 to 500 feet a second. It's very well to talk of yards and feet and estimated speeds, but in the final analysis the fighter pilot must learn by experience to make accurate judgments on these points. And, like any other activity dependent upon physical skill, coordination and alertness, the only road to expert rating is marked "Practice, Practice and More Practice."

I can't tell you the high percentage of young pilots who do qualify as "expert marksman," but the record amazed me. Evidently young America can be taught to fly expertly in much shorter time than originally estimated and to shoot expertly, too.

Thinking of firepower from the air, just reflect what it means to see the modern Air Corps fighter belching streams of lead from eight 50-caliber guns. The projectile of a 50-caliber gun is more than a half inch in diameter—good for a range of more than a half mile. One burst from such a battery of flying guns is sufficient to cut the wings completely off the helpless target plane or virtually saw in half the fuselage of a bomber.

★ ★ ★

### Germany's Upside-Down Tactic

The other day I saw a report on the latest German single-seater fighter tactic for attacking American four-engine bombers. Since the lowest concentration of big bomber fire power is in the nose and ahead, this naturally attracted the attention of the Nazi fighters. In addition, the nose of the bomber has less armor protection than other vital points. This is the reason for the concentration of Nazi fighters working against the nose of the big bombers. This means a head-on attack. It's a touchy, ticklish job flying right smack at the nose of a target that is traveling at 250 to 300 miles per hour right at you. But the Nazis must have become satisfied that they were not making headway tackling our four-engined jobs from any other quarter and decided that they would have to work on the head-on angle.

The natural question that arises is: how to get in the burst of gun-fire and still miss flying into the big target. The Nazi solution was to hold the fighter dead at the nose of the bomber and stay in that line of flight until well within range. It seems that the Nazi fighters began to turn over to the inverted position just prior to coming within range — maintaining the same altitude as the bomber and then when within actual range turning loose a burst of fire. This maneuver placed the fighter in an excellent position, as far as quick response to the plane controls was concerned, to get in that burst of fire and start a quick dive. In other words, the whole task is to get in a burst of fire and avoid collision. This means that the Nazi fighters have been trained in handling a plane upside down. Now, should a student combat airman be taught anything about inverted flight? And, if so, how much?

Well, I don't know, or rather, I don't want to argue about it. But I do know this: When I was a youngster in this flying game, I counted every attitude in which it was possible to put a plane as a potential crack-up for me until I had experienced the job of handling my plane in that position. The right side up tailspin was the first. That solved, I went through every known maneuver involving what we call normal flight (right side up).

The next bracket of potential danger was all the plane attitudes involving inverted flight. I had tackled the inverted tailspin and the outside

loop and the inverted loop and, in turn, all the maneuvers a plane might assume in inverted flight. With every attitude covered and a clear picture in my mind as to what put it there and what adjustment of controls was required to bring it back to normal flight, the flying business had been stripped of all its mystery.

There are gunsights ahead of you in a fighter which must be nailed on the target, and the entire plane must be maneuvered to keep those sights on the target — irrespective of the attitude of your plane. A gun fired upside down hurts just as much as one fired rightside up. And, therefore, if the chase of an enemy plane lands you on your back, and the target comes within that gunsight — that's the time to press the trigger. But no man is going to be able to fly or shoot upside down unless he has practiced inverted flight.

In war flying you are going to be upside down whether you like it or not. And since flight training for combat work in the air means conditioning the student to meet all the exigencies and emergencies he will meet in actual air combat, it seems only logical to attend to this critical matter of becoming experienced in inverted flight before he engages in his first air fight.

★ ★ ★

### Philosophy of the Line

The mechanics, God bless 'em, are the home-made philosophers. They know the relative standing of every airman on the post, the tricks of every plane in operation. Standing on the line the other day, I heard some Air Corps mechanics priming the pilot of a fast, single-seater fighter. They wanted him to "shoot" up the field. Did they ask him to put on a few "buzzing" maneuvers? No, indeed, that's too crude and beneath the technique of an old, seasoned line mechanic of at least eighteen months' service. They simply told the Air Corps fighter pilot—by talking among themselves loud enough to be heard in the next town—about the aerial exploits of a Navy single-seater fighter pilot who dived and barrel-rolled his plane the full length of the field the other day.

★ ★ ★

### Yardstick for Safety

Surely we have had enough of all kinds of aviation by this time to interpret air crashes and air casualties statistically instead of as more headline and thrill material. Of course, there are more crashes nowadays than previously. But a numerical increase in crashes means nothing at all, unless the increase in flying hours is considered. Then too, the type of flying must be considered as an influencing factor.

I cannot give the exact figures (for obvious reasons) of hours and miles flown during any given period at the Air Force training schools. It must suffice, therefore, to present the facts by stating that at any standard Air Corps flight training center there are more hours flown in any month than were flown by the U. S. Army Air Corps during any previous year.

It goes without saying that we cannot use our peacetime yardsticks for evaluating hours and miles flown, because our student pilots are now flying combat planes and engaged in combat training operations. Yet our war ratio between crashes and hours flown is far lower than our best peacetime record.

The average, healthy, young American accepted by the Air Corps for combat flight training has completely upset the estimate of all pre-war experts. The American youngster who had to be content with wishing he could fly has fooled everybody by the aptitude with which, after a remarkably short training period, he daily handles fast single-seater and multi-engined combat planes. The safety record established by young America in the piloting of combat planes is the real headlines news of the air world.

★ ★ ★

### Debunking the Formula

Here's a pre-war theory that has been scuttled by the performances of young America in the Air Corps training centers.. This is the requirement that a college education, or two years of it, "or its equivalent" was a necessary qualification for a pilot. That theory was nonsense and now is proven nonsense by statistics which show that the college graduate outranks the mere high school graduate by less than fourtenths of one per cent in all-around adaptability and fitness for aerial combat.

As long as I can remember in this flying business, there has been a definite trend toward standardizing our conception of the flying man. The first move toward personnel regimentation was concerned with height and weight. The specifications were shifted from time to time. Generally, the maximum height for a student airman was six feet, and the weight ranged around 175 pounds. There are reams of records and controversial treatises on how big or how small a man should be for military flight duty. Actually the physical factor was incidental. Candidate airmen at flight schools often possessed superb physical assets and somehow or other failed to click. Athletes with national collegiate reputations could pass any medico's examination, but sometimes were rejected as flying men. Yet humans of all sizes, weights, heights and descriptions were being turned into crack airmen.

But there have been bitter controversies over how long or how short the flying man should be for a given type of ship or a given flying task.

Little, chunky men have become crack all-around airmen. Long, lanky individuals do the flying job equally well. Little men have set their hearts on flying great big bombers, and long, lanky fellows have been just as determined to pilot tiny racing planes and small fighting ships. As a matter of fact, during the years, we have been attracted to the fact that nine times out of ten the crack big-plane pilot—bomber or transport—was a small fellow, while the six-foot lad was challenging hell and high water for a seat in the tiny fighter plane. In short, it required no great mental machinery to become aware of the fact that the physical make-up of the human was only of incidental importance, and that "something" else—something intangible—was the determining factor, and the difference between the crack pilot and the mediocre airman.

The difference between the crack pilot and the mediocre airman is temperament difference. We have no yardstick for measuring it. It's there or it isn't.

★ ★ ★

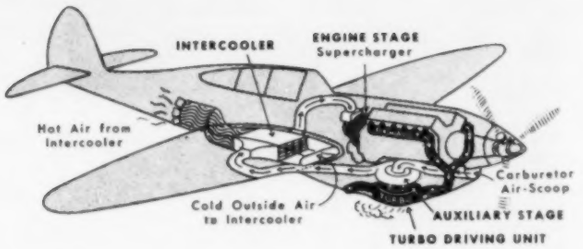
### The Gospel of Flying

It must be a religion, this flying business. Nowhere else can you find so many people burning so much precious energy, building such bright dreams, or pouring so much of their very souls in any effort. Here with the Fighter Training Command in the field, I hear, eat, sleep, drink and talk nothing but fighter flying. The topic least mentioned is the "war." These eager young airmen talk of the war only in the form of "combat duty." Combat duty is the end toward which all are working feverishly.

Despite their youth and burning enthusiasm, always associated with a certain sort of impatience, they will sit and listen to anyone who talks flying. I saw a veteran airman hold hundreds of these young fighting airmen for almost an hour as he explained the law for attaining the status of crack airmen. Here are some of the highlights of that "talk from the cockpit." The physical aspects of the en-

*(Continued on page 40)*

# *About* SUPERCHARGERS



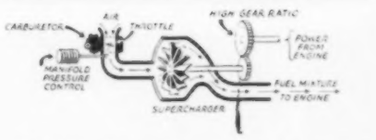

SOME combat planes operate most efficiently at medium altitudes. Others aren't suitable above low altitudes. Still others ignore low and medium levels and soar to extreme heights before they attain peak performance. As far as power is concerned, their chief difference is in the kind of superchargers with which they are equipped.

Without superchargers, the airplane engine would get only one-fourth as much air at 40,000 feet as at sea level, one-third as much at 30,000 feet, half as much at 20,000 feet and three-quarters as much at 10,000 feet. But with proper supercharging, the engine is supplied with air of sea level density at all levels on the upward climb to the ceiling.

Seven types of altitude superchargers were recently selected by General Motors research scientists and aircraft engineers to explain, in non-technical terms and with simple illustrations, how various superchargers differ. The drawings, and a condensation of the explanation, presented here are from a booklet issued by GM for limited distribution among its employes.

TYPE 1 ALTITUDE SUPERCHARGER

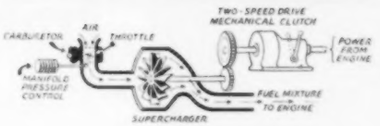
**SINGLE STAGE WITH ONLY ONE SPEED**




The simplest and easiest way to turn a sea-level engine into an altitude engine is (Type 1) to install a gear ratio that will drive the blower at a higher speed—and then add a control device to curb the degree of supercharging at low altitudes. This control is provided by an automatic regulator which functions on the principle of an aneroid barometer. It operates a special throttle valve located in the supercharger air intake passage. The throttle valve automatically restricts the air passage at low altitude and increases it at higher levels. The single-speed gear which drives the supercharger thus becomes a handicap at low levels, penalizing the engine at take-off and during early climb. To remove the valve control would be to overstress the engine at low altitude, ruining it in only a few minutes of high compression caused by too much air intake. From this it is seen that good performance at varying altitudes demands superchargers of more than one speed ratio.

TYPE 2 ALTITUDE SUPERCHARGER

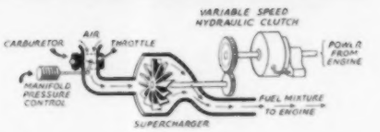
**SINGLE STAGE, TWO SPEED, MECHANICAL CLUTCH**




Type 2, the single-stage, two-speed supercharger with mechanical clutch, overcomes the principal disadvantages of Type 1 by employing two separate gear ratios—a slow speed for take-off and early climb where less supercharging is needed, and high speed for higher altitudes. Gears are changed at a predetermined altitude either manually or by aneroid control mechanism similar to that operating the intake valve. But the clutches used must withstand heavy loads and severe shocks, penalizing the engine with greater weight and mechanical complication.

TYPE 3 ALTITUDE SUPERCHARGER

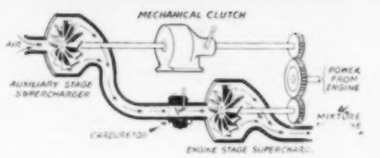
**SINGLE STAGE WITH VARIABLE SPEED CLUTCH**




A refinement is effected in Type 3 by substituting a hydraulic clutch for the mechanical one, giving the supercharger a drive similar to that used by autos having "hydramatic" clutches. The pilot can utilize an infinite number of speed ratios through aneroid control, which causes the supercharger to run faster and faster as altitude is gained. He can slow it down at low altitude without wasting power by choking. But the hydraulic clutch is more complicated, heavier and bulkier than a gear drive. It generates heat, requiring cooling for the oil.

TYPE 4 ALTITUDE SUPERCHARGER

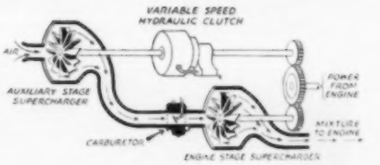
**TWO STAGE WITH MECHANICAL CLUTCH**




Type 4 consists of two separate blowers with their airflow lines connected in series. The engine stage blower is the same as a seal-level supercharger, being driven by a fixed gear and running at a constant speed in relation to engine speed. The auxiliary stage is used only at higher altitudes and is brought into operation by a clutch. With only one blower running at low altitudes, the power curve approximates that of the sea-level engine. But when the auxiliary equipment is put into operation, the curve takes an upturn. At levels above 20,000 feet, the power is better than with Type 3 equipment. Weight and "plumbing" have become serious.

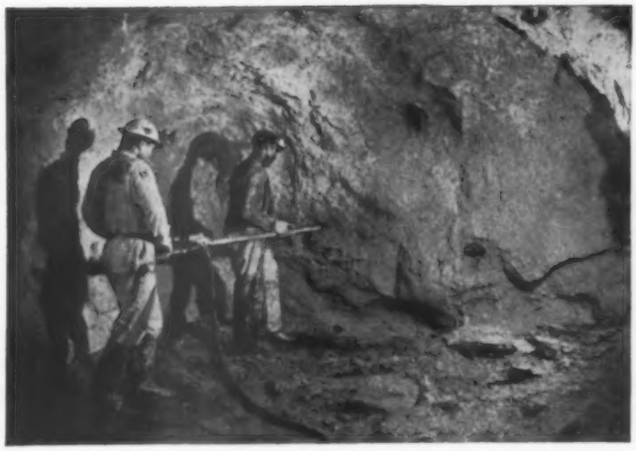
TYPE 5 ALTITUDE SUPERCHARGER

**TWO STAGE WITH VARIABLE SPEED CLUTCH**



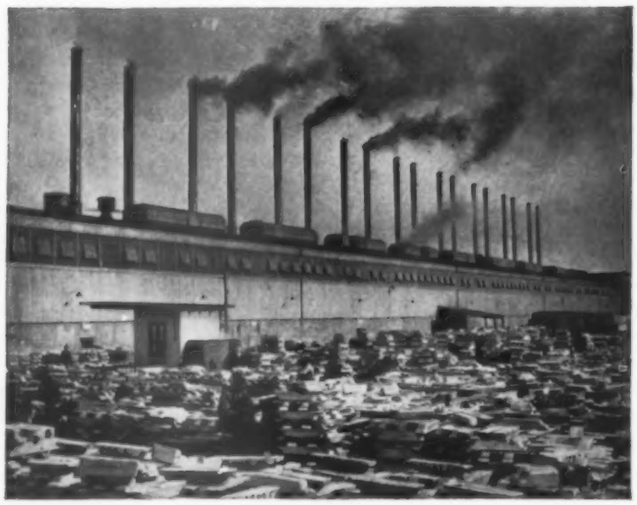

Considerably more power is obtained by using Type 5 supercharger, which is two-stage with variable clutch. Thus the aneroid-controlled hydraulic clutch begins at sea level to cut in the auxiliary equipment, gradually increasing its capacity by degrees and thus providing the desired compression consistent with not overstressing the engine and not getting into mixture temperatures that would cause detonation. This furnishes more power for climb. The mechanical complications and weight penalties are a combination of those mentioned in connection with Types 3 and 4, but the advantages are considerably greater.

*(Continued on page 39)*



**1** Reynolds Aluminum and Reynolds finished parts start here, in this bauxite mine near Little Rock, Ark. Reynolds is now mining more bauxite than was mined in the entire country before the war.

**2** From the mines in Arkansas, the bauxite is shipped to the Reynolds Listerhill, Ala., plant. There, it is carried up conveyor belts, crushed and mixed with caustic soda.



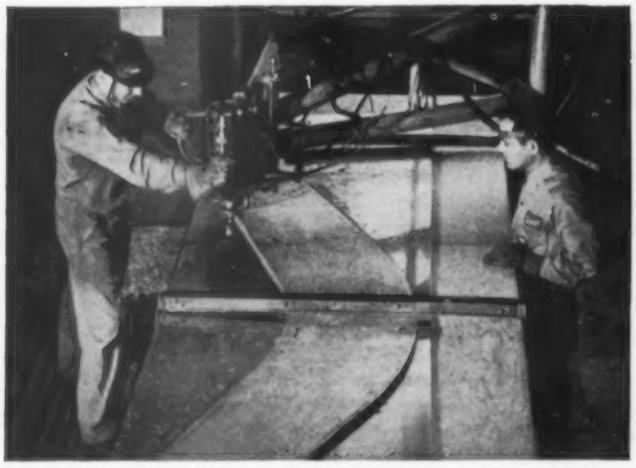
**5** Aluminum ingots, shown stacked in a Listerhill storage yard, are fed into remelt furnaces along with various alloying metals. The resulting alloys are cast into huge billets for rolling.

# From Reynolds Mines

Out of American bauxite, Reynolds is processing high-grade aluminum and fabricating finished aircraft parts because Reynolds — with 20 years' experience rolling light metal — had the vision to foresee the need and the courage to back up its vision with action.

Back in 1939, Reynolds started mining "lean" domestic bauxite to free the U. S. from foreign sources of supply. Now Reynolds is mining 36% more domestic ore than was mined in this country before the war.

Risking everything, Reynolds built tremendous new factories to process the ore. One plant in Alabama was conjured out of a pasture in five months and 28 days — the only plant in the United States where bauxite goes in one end and fabricated aluminum for aircraft comes out the other. Now Reynolds is turning out more aluminum than France and England combined in 1939. And this aluminum averages 99.6 percent pure or better.



**7** Aircraft manufacturers provide Reynolds with blueprints, templates and specifications. Reynolds does the rest — routs, shears, blanks, heat-treats, anodizes, chromidizes and paints the parts. Here's one of the Reynolds routing units in operation.

**8** Reynolds finished parts, flowing direct from the aluminum source, not only save skilled manpower and valuable space at aircraft factories, but completely eliminate scrap handling and expense. This 200-ton press is stamping out window frames for a fighting plane.

**3** The bauxite is carried through many technical operations in this huge aluminum plant at Listerhill, Ala. It emerges as a fine white powder — aluminum oxide or alumina.

**4** The alumina is dissolved with cryolite in special carbon lined tanks where oxygen is separated from the aluminum by electric current. Aluminum is poured into pig molds to form ingots.

# to Finished Parts!

To top all this, Reynolds has established a complete aircraft parts division, offering these advantages:

**Saves Scrap Handling.** Shipments of aluminum parts to manufacturers are *net*. The usual 30% scrap loss *stays at the mill*. This metal is put back into production at once. Scrap handling and shipping are eliminated.

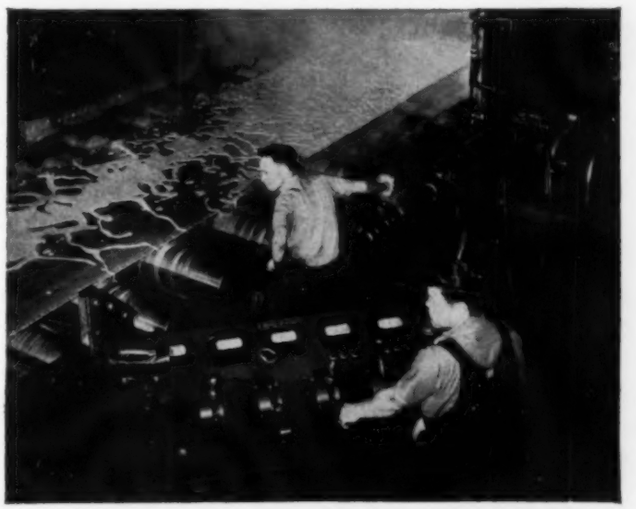
**Saves Manpower.** Thousands of trained Reynolds workers and 250,000 sq. ft. of additional floor space are devoted to finished parts, relieving labor in aircraft factories.

**Saves Space.** Reynolds parts release aircraft plant space formerly tied up fabricating parts and handling scrap.

Take advantage of this new, complete service. Let Reynolds fabricate your aircraft parts *at the aluminum source*.

REYNOLDS METALS COMPANY
General Offices, Richmond, Va. • Parts Division, Louisville, Ky.
LEADERSHIP IN ALUMINUM

**NO SCRAP...**
**You Buy Parts Ready for Assembly**



**6** After proper pre-heating, the alloy billet or slab passes through large rolls under tremendous pressure. It emerges as a broad ribbon of gleaming metal.

**9** Finished parts pass rigid Army and Navy inspection at the Reynolds plants to meet exact specifications as to chemical and physical properties, size, hardness and surface. Then, they are shipped to aircraft manufacturers ready for assembly.

# Let's Look at the

"The people are ready to fly." . . . Fifty thousand persons recently watched Col. H. F. Gregory demonstrate the Army's Sikorsky helicopter at National Airport in Washington.

**The Administrator of Civil Aeronautics views the record on occasion of the twenty-fifth anniversary of air mail service, and suggests broad planning for the future.**

THIS year marks the silver anniversary of the Air Mail. Any twenty-fifth anniversary offers opportunity for appraisal and planning which should never be missed. This is particularly true in a youthful activity like flying which has recently grown into an industry.

During 1943, we ought to render honor to the men who started Air Mail twenty-five years ago, and to those who have helped through these twenty-five years, to build up the structure of which the Air Mail Service was the cornerstone. It is a long list, too long to print, and many whose names are on it are no longer here. Many are no longer flying, and many others are in high places now where they are continuing doggedly or brilliantly, as the case may be, their consuming effort to build up aviation.

We ought also to total up our accomplishments, see to what extent we have made good our promises, determine how to make new promises as predictions for the future come true, study the faults of the past that are to be avoided, and try to provide leadership to the general public of the world, which may be just about to really begin to fly.

The Civil Aeronautics Administration sparked a joint nationwide effort to render due honor to Air Mail pioneers at observances staged at Washington National Airport, and many other points May 9 to May 22.

### Accomplishments Cited

At Washington we had an excellent observance, owing to the willingness with which Army, Navy, other Government Agencies, the NAA and the airlines co-operated, and to the eagerness with which people, and particularly aviation people, thronged the airport to see some flying. It was great, I can tell you, for oldtimers and newcomers alike to hang around an airport again for a full half day and watch airplanes doing something other than staid, steady take-offs and landings, and to find dozens of old friends to talk to. The "hangar-flying" that took place that day on the public address system and off it was, I think, the high point of the whole program for many of the 50,000 who attended.

We didn't get around to honoring all who deserved it. That is a job not to be done in a day, but it should be on the minds of all the industry throughout this special anniversary year.

It is a pleasure to total up our accomplishments. They are considerable and important. We have an air transportation system within this country unmatched elsewhere in the world, with an airline organization so efficient that more passengers and more mail are being flown with fewer planes than ever before. We have planes which have been developed directly out of the test runs of Air Mail routes which are worth their weight in human lives in the prosecution of the war. We have a reservoir of piloting, operating and maintaining skill which, with the additional flow from our wartime training activities, has enabled us in a little more than a year of war to wrest air supremacy from our enemies. We have airplanes, instruments and accessories service tested in the hands of our commercial transport pilots which enable us now to hop over oceans and continents, and which have made flying the safest way of crossing the Atlantic.

THE AUTHOR

# RECORD

By CHARLES I. STANTON
Administrator of Civil Aeronautics

"Our air transport system is unmatched elsewhere." . . . These American Airlines DC-3's are performing more tasks than ever before. Identical planes, taken over by the Army for global transport, are flying incredible loads over uncharted regions—for victory.

We have an airways system invaluable to the prosecution of the war. Today's airways figures show that eighty-five per cent of the traffic on the nation's skyroads is military. We have radio flying aids which make us able to defy all but the very worst of weather.

We have planes that are built for carrying twenty-one passengers which in one case carried seventy-two people up and away from an enemy rapidly closing in upon them. We have bombers which carry several tons of bombs, or the fifty-nine pilots who crowded into such a plane recently for a flight away from the approaching enemy. We have veteran planes with records of amazing flights: one which crossed the Atlantic twelve times in thirteen days; another which made a round trip between Natal and Dakar in twenty-three hours and fifty-nine minutes.

We have these and many other things which are still secret and may not be bragged about. But commercial and private civil aviation have a balance sheet going back over these twenty-five years of which we may all be proud.

As to our promises, we have been making good on many of them. We have said, "If we can build up a healthy and stable aviation industry in time of peace, it will be valuable in time of war." I think we have proved that one up to the hilt.

In time of peace, we produced men like Frank Ware, a mechanic on one of the divisions of American Airlines, keeping the ships flying between Cincinnati and Chicago, and later over a whole system. Now, with war on, Frank Ware is Assistant Director of Maintenance and Overhaul, and he is barging about all over the world on this job. Not long ago, he helped pull two cylinders on an engine of a ship standing at the end of an improvised runway in Greenland, fifteen miles inside the Arctic Circle, with a wind of fifty-five miles an hour blowing, and the temperature at twenty degrees above zero. He learned how to do such jobs while changing cylinders in an Indiana field the winter of 1927 when he helped start Air Mail Route No. 17. He came through Washington recently as a member of an airline committee headed for North Africa to set up maintenance stations along our air route from Dakar to Cairo.

We produced men like Dick Merrill and Jack Lambie of Eastern Airlines who made the first round-trip commercial flight across the Atlantic, and brought back the pictures of the Coronation. Today they are flying on world airways, using the "know-how" they developed in airline flying.

We have produced airline mechanics and engineers who can take identical planes and fit one of them to operate successfully in a dusty Sahara "oven" and the other off the ice fields of Greenland, and we have produced iron men who can take it for a month or more on a tossing sea, starving, thirsting, and desperate, with enough initiative and originality to cheat death.

## About Government Participation

I could go on for pages naming your friends and mine who were in commercial aviation who are now helping invaluably in war with their specialized knowledge of flying and all that goes with it. We've kept that promise, too.

But we have made some other promises that are yet to be fulfilled. A healthy aviation industry, we have said, will help tide over postwar economic disturbances. All signs point to the ability of the aviation industry to help importantly in this direction. There are several "ifs", however, which will be discussed later.

We have said that aviation will knit the world together. That is the political side of our promise, and there is more assurance that this can be done than there is in connection with the economic speculation above. Our young men are in all parts of the world today. They are meeting face to face the people of the world with whom they are hereafter to live far more closely than their parents before them. Almost without exception, these young men are bound to their homeland by airways. They have become accustomed to thinking of their distance from Main Street in terms of flying hours. They are certain to be less provincial than their parents. They cannot possibly ignore the effect of rapid communication by air between the peoples of the world. I believe they will come home freed of the quaint idea that we live entirely to ourselves on this shrinking world.

I think we can keep both these promises, but we must consider the "ifs".

If we profit by our experience, we will avoid the mistakes of the past,

"These men are connected with their homeland by airway." . . . Army Air Forces crews shown readying a North American B-25 Mitchell in a combat zone. Though thousands of miles from the U. S., these men rely on aviation to supply many vital needs, rushing supplies across seas and continents to their faraway outposts.

some of which would prevent our delivering on these promises. Among these are lack of understanding and sympathy—even suspicion between government and industry. Sometimes I think we work this suspicion theme overtime in this country. Industry finds it very convenient to sit in its offices out in the States and blame Washington for everything. Where it can single out an individual in government, that makes it perfect; and too often they excuse their own shortcomings by condemning him.

Government frequently tries to reverse the procedure and blame industry while it does nothing constructive. Sometimes government falls back on the old practice of passing laws and establishing regulations, and considers it has done its duty by legislating and enforcing. This is not so good for a young, growing business like aviation. It can easily be carried to a harmful extreme—and in some cases it has been—temporarily, thanks to a democratic sense of proportion.

However, government, in many of its branches, is becoming aviation-minded by leaps and bounds. Industry in many of its branches has increasingly been looking to government to provide ways and means by which it can live in the manner to which it would like to become accustomed. In that situation, I believe, lies the potential hazard which surrounds a late teen-age boy with too many doting aunts, uncles and grandparents. Certainly the magnificent progress in development of our civil aircraft and air transportation with comparatively little direct participation by government, as compared with the achievements in those countries where government undertook the major initiative and financial support, is worth pondering.

There is danger, however, in too many agencies of government becoming involved in aviation matters.

A big question posed for government and industry today is whether we can jointly keep up with the demands which the people are going to put on us for flying when peace comes. If we meet these demands successfully, we'll do well, and there will be no time for lethargy or suspicion between us.

The people are ready to fly. After the war there will probably be 300,000 who can fly. There will be many hundred thousands of others whose contacts with flying during the war have been intimate and profitable, and they will be easy converts to the air age. Do we have airplanes ready for these people? Do we have landing areas, airways and flying aids either ready or in plan form for this surge of popular flying? Has government or industry found any time for studying these problems in the midst of the war job we are doing?

There are isolated cases where something has been done. We in the CAA have had future private and commercial flying needs constantly in mind when building or improving airports for today's military activities, in laying out airways, in developing flying aids. I think we might have done more, but our war job has been just about all we could handle, including a tremendous airways and airport job, and an unprecedented pilot-training job. Actually, the results of these war programs will be valuable leftovers for private and commercial flying. Less obvious but nevertheless important is the work of CAA inspectors who have ungrudgingly shouldered the thankless task of carrying out the special wartime regulations, requiring investigation of identity, citizenship, and loyalty of airman certificate holders, designating and guarding of airports and registration and clearance of all flights, insisted upon by military authorities as the condition upon which civil aviation activites would be permitted to continue during wartime. The airports and commercial operations which manage to carry on in spite of complications, and rationing of parts, gasoline, and customers will, no doubt, have performed some service to the war effort and will be priceless assets when peace returns and the upsurge in civil aviation inundates the country.

### Charting the Future

We have tried to make a start during wartime in better flying regula-

"Valuable leftovers for private and commercial aviation." . . . Wartime air base construction such as this, pictured at Lafayette, Louisiana, has greatly increased America's aviation facilities. After the war there will be hundreds of new airports where none existed before.

tions and fewer of them, realizing that Civil Air Regulations have "just growed" during the years, and that they need a complete overhauling. We tell pilots that we want to cut down and simplify these regulations and associated bibliography so that they will fit into a pocket instead of a trunk. Most of that is still to be done, however.

If I were asked to suggest developments to which we should give thought today, assuming that we could spare some time from our several war jobs to do it, I would mention these:

Continue planning of a nationwide system of airports designed to provide every population center with an airport of a type suitable for its reasonable prospective needs.

Draft a program for rapid and efficient conversion of our manufacturing facilities to peacetime operation.

Work out a national plan by which postwar sales of airplanes can be promoted through the purchase of bonds today.

Provide authority of law for carriage of all first-class mail by air whenever and wherever ultimate delivery can be advanced over that possible by surface transportation.

Make education in all phases of aviation and related matters available to all students in public schools and colleges.

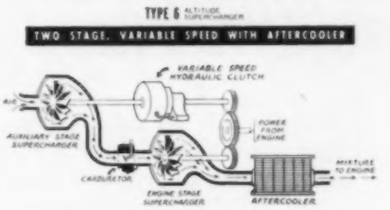
★ ★ ★

## Plane of the Future

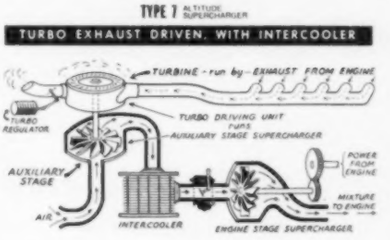
W. T. Piper, builder of the famous Cub, says the light plane of the future will be "of conventional design, low-wing, about seventy horsepower, a gearshift for easy take-off, air brakes and will cost about $2,000."

## ABOUT SUPERCHARGERS

*(Continued from page 33)*




Development of the five types of superchargers so far discussed has created a serious problem of heat, and Type 6, a two-stage variable-speed supercharger with an aftercooler, provides a special radiator for cooling the compressed air after it passes from the second blower and before it enters the engine. This permits the auxiliary stage blower to run at extreme speeds without danger of detonation. This type becomes remarkably efficient above 20,000 feet, but the weight factor is augmented by a problem of drag

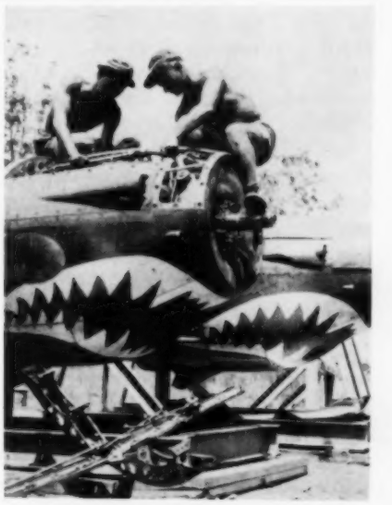



resulting from the radiator's cooling surfaces.

The most efficient supercharger is Type 7, which utilizes a turbine to drive the auxiliary stage blower. Power for the turbine comes from exhaust gases, which remain the same while the pressure of the outside air steadily declines with altitude, thus imparting to the turbine a variable speed characteristic within itself, eliminating need of a variable clutch. Here the compressed air is cooled by locating the radiator between the auxiliary stage blower and the carburetor. But the excellence of the turbo supercharger is not without its disadvantages in bulk, weight and other complications which greatly increase the problems of installation.

★ ★ ★

## Twin Sharks Fight in South Pacific



The twin Allison engines on a P-38 have been decorated with the famous shark design, popularized by the Flying Tigers. In this photo, Corporals Leo P. Brooks of Grady, Alabama, and R. T. Barber of Montana are shown in a New Guinea jungle as they begin an overhaul of a Lightning's twin sharks.

★ ABILITY

★ PRECISION

★ PRODUCTION

DOLAN AIRCRAFT MANUFACTURING COMPANY
DALLAS, TEXAS

## SKY'S THE LIMIT

*(Continued from page 28)*

are: (1) the railroads and steamships, (2) the trucklines, (3) the airlines, and (4) private transport, both automobiles and airplanes. We don't know exactly how these stack up, comparatively, but believe that private aviation hauled in peacetime more people more miles than the airlines. We are sure that the twenty million automobiles in this country have hauled more people than the railroads, over more miles.

Fourth, since the rationing of tires and gasoline a great many more people have tried to use the railroads, and the busses, and airlines. This has produced such a congestion that the service on all of these systems is slow, inadequate, in many cases terrible—sometimes you can't even get a seat.

With more work for everyone to do, we suddenly find more impediments—it's a lot harder to get around, sometimes almost impossible. And whether the government wants to admit it or not, they know that travel is vital and necessary. Three-fourths of the time you can get more done by a personal trip than you can by writing a letter or calling on the phone. So—

We think private aviation should be stimulated—at this time—for the sake of the country and the individuals who make up the country.

For example: We have an automobile that makes twelve miles to the gallon — and when we go slow enough, the tires may last thirty thousand miles. We ride in that car, usually alone.

We have an airplane (Culver) that does twenty-four miles to the gallon, will go sixty or seventy or more thousand miles on a set of tires. All the tires on a Culver would amount to one-half of the spare tire on the car. Besides all this, the car is slow (35 mph), hot (100 degrees, at this writing), and cost as much as the Culver, almost. The Culver is air-conditioned (if you fly up about a mile) and fast (120 mph). There are no flies, no dust, no corners, no stop lights, no traffic to worry about.

Of course a lot of airplanes won't do what the Culver will do, but in speed, tire consumption and gasoline requirements, they are still a lot better than automobiles.

We know that a number of manufacturers have plans for new airplanes that will really perform. They use a minimum of strategic materials—a lot of them will use plywood. A little planning on the part of the government would permit these airplanes to be made available to companies and private individuals who deserve them. This would provide more and more economical (as far as critical materials are concerned) transport than can be accomplished any other way.

The number of new automobiles left in the country is rapidly diminishing. It will not be very long before it becomes necessary for us to build new automobiles, new busses, new trucks, new transport aircraft, etc. While we are doing that, let's insure that private aviation is represented, too. It's good for the country.

**WANTED**

**Twin-Engine Airplane**

**Five or more passengers. State make, year, equipment, hours (total and since overhaul), price and present location. Write Box No. 750, SOUTHERN FLIGHT.**

**DALLAS 1, TEXAS**

## FORMULA FOR FIGHTERS

*(Continued from page 32)*

tire flying game are important, but only incidental to airmanship. Health and how to maintain it are vital, too, but incidental. It's neither weight nor the height, nor the width of a man that matters. It's the little light somewhere inside. That's what counts. And in that group from whence come the real airmen, the light glows white. It's a curse as well as a blessing to the owner. It burns away everything and everybody within reach. Nothing else matters; nothing must stand in the way of the man whose heart is set and whose hopes are riveted on the earned title of "Airman." There are no short cuts, no political strings, no help on earth can weasel that rating. All or nothing. First your plane and then your sweetheart.

★ ★ ★

### Symphony of Air Power

It's just before daybreak. There's a promise of something in the way of light below the eastern horizon. There's more than a promise of noise half-way down the long corridor in the barracks. They are the grunty "Good Mornin's" and bright, crisp greetings and then there are ribbing salutations. There's a sound of water falling and here and there a solo, broken by a yell as the all-cold shower is turned on.

In the distance and muffled by the intervening hangars, there's the hum of motors as "pre-flight" mechanical crews warm up and test hundreds of motors. I join the parade of slithering sandals, towels and shaving gear.

Breakfast is a jolly affair; bacon and eggs—eggs, anyway—a lot of breakfast cereal and milk. Coffee still is the standard breakfast potion, but the glass of milk is in demand among flying men. One word from the flight surgeons, and the flying man will eat or drink anything to improve his physical condition. I have seen these young fighting airmen eagerly selecting carrots prior to touching any other vegetable. A query here and there disclosed the fact that carrots are good for night vision. So it's carrots first among vegetables, and I think these eager airmen would eat crocodile toes if some reputable medico said crocodile toes contained vitamins conducive to improve aptitude for flying.

There's no bell ringing or warning that vigorous work and assignments await. But somehow or other the eagerness to be off and at the business of the day empties the "chow" hall. The chatter around the breakfast tables always is about flying. In the midst of interrupted eating and hand gestures, demonstrating some attitude of a plane in the air, would come the exclamation, "Hey, land that plane before you crack up and pass the sugar."

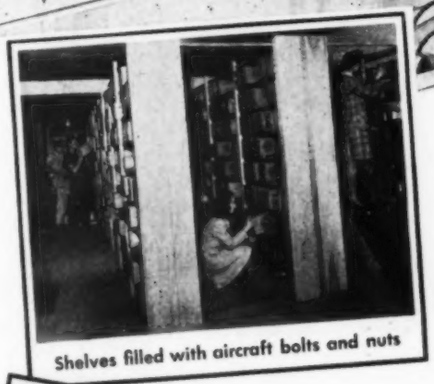
It's aerial gunnery, aerobatics, flying and more flying.

After I make a flight in the Gulfhawk, I spend hours answering questions. How does it feel to do this or that? What did you do with the controls to execute this or that maneuver? That straight-up climb, that vertical climb to a stall at the top and the pinwheel reversal, diving down the very same flight path again—how is that done and why does the plane behave that way? How long have you been flying, and how much practice does it take, etc.?

The competition for high-gunnery scores is one of the points around which most of the high morale revolves. Neither heat nor cold nor dust nor discomfort discourages these flying, fighting Americans from begging for one more reload for another diving attack on the target. The next "run" —that'll be the one.

It's late at night and from far off comes the moan and rumble of engines —students learning to be night fighter pilots. It's a symphony of power and a symbol of the might of air power.

# We'll help you keep trying to keep 'em flying!



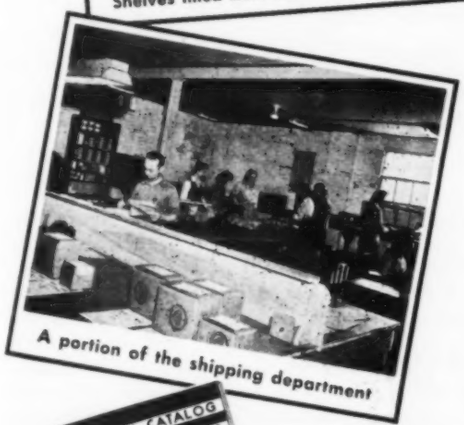
Shelves filled with aircraft bolts and nuts

DEALERS and FLYING SCHOOLS from the Alleghenies to the Rockies, for more than a decade have considered Supply Division, Inc., their "Warehouse Annex"—a dependable source of charts and carburetors, propellers and parachutes . . . all kinds of airplane parts, accessories and apparel.

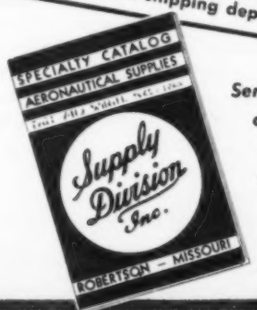
And AIRCRAFT MANUFACTURERS, too, turn to this company for emergency needs to keep production schedules on the nose.

THE RESULT is that today Supply Division, Inc. is one of the largest, most experienced distributors of aeronautical supplies in the country. Located at the country's crossroads of the air, it offers speed and economy in deliveries—immediate service by air express on all available products not restricted by government priorities.

Next time you're wondering where to put your fingers on a badly-wanted item, phone Supply Division, Inc.—Terry-hill 5-2902, St. Louis.



A portion of the shipping department




*Send for a copy of this new Specialty Catalogue*

## SUPPLY Division Inc.

LAMBERT AIRPORT, ROBERTSON, MO.

YOUR *"Warehouse Annex"* FOR AERONAUTICAL SUPPLIES

# The Arizona Way

**Wartime expansion of military flight training has made Arizona one of the world's busiest instruction centers. U. S., British and Chinese Air cadets are receiving training there on a 24-hour schedule.**

By ESTHER H. FORBES

WITHIN a radius of thirty miles from Phoenix, Arizona, have sprung up five flight training schools, which train about one-half of all U. S. Army pilots turned out by the West Coast Training Center, and, in addition, about one-fifth of the RAF pilots and all the Chinese pilots taught in this country.

A plane's-eye view of the city shows Phoenix at the center of a circle from which radiate acre upon acre of cultivated cotton fields and cow pasture. Sitting on the edge of the circumference out in the desert are the airfields. Geographically, they start to the west of the city with Luke Field, the largest single-engine advanced school in the country. Next come Thunderbird Field and Thunderbird II, primary schools, to the north; Falcon Field, an RAF primary and advanced school, to the northeast; and Williams Field, a twin-engine advanced school, to the southeast. (To the southwest is a range of mountains, beyond which lies a Jap internment camp.)

The stampede to Phoenix started in September, 1940, when Southwest Airways bought a flight school at Sky Harbor, the commercial airport, to operate for the CPTP, now the WTS. The company was, in fact, formed more as a flight school than as an airline by two Californians, John H. Connelly, a former engineer and test pilot for the CAA, and Leland Hayward, a director of TWA, an actor's agent in Hollywood, and husband of Margaret Sullavan. It was Connelly, who had often flown over the country to go duck hunting and been impressed by its cloudless climate, who suggested Phoenix as the perfect place for a flying school.

### Civilian Enterprise Turns Military

What thus started out as a small civilian venture has since developed into a huge military training program When the Army announced in 1941 they needed more pilots, there were not enough pilots already in the Army to train that many students, and so the Army decided to give civilians the contracts for all the primary training. Southwest Airways obtained one of the first contracts and immediately began construction of a field which they called Thunderbird after the company insigne. Still expanding, they opened a second primary school last June, Thunderbird II, which is a small-scale replica of the original Thunderbird.

Today Thunderbird Field (I) is the largest primary school in the country and probably the most glamorous. Hayward, with his Hollywood experience, knew how to make the desert attractive to young cadets. He studiously avoided all semblance of the usual Army barracks when designing the buildings. Colonnaded and built around courts which are planted with green grass and brightly colored native shrubs, the air-conditioned living quarters look more like a Mexican version of the dormitories at Thomas Jefferson's University of Virginia. Two swimming pools, where the cadets can take refuge from the heat during at least part of their strenuous athletic program, provide the finishing touch.

Thunderbird is not the country club it has been nicknamed by the cadets, however. It is a school where the cadets have to work harder, both mentally and physically, than ever before in their lives. Since neither thinking nor exercising comes easily on a scorching summer day in Arizona, Hayward merely tried to create as pleasant surroundings as possible for the boys to work in.

Like Gaul, the cadet's course is divided into three parts: physical training, ground school and actual flight instruction. One day a cadet will fly in the morning and will have ground school and athletics in the afternoon, and the next day he will reverse the order. This is to distribute the various weather conditions as evenly as possible. In the morning the air is always smooth as well as clear, but in the afternoon, it becomes very hot and usually quite bumpy because of the surrounding mountains.

Actually a cadet spends only about one hour a day in the air. In his nine weeks at Thunderbird he is given sixty hours of flying—twenty-nine dual and thirty-one solo — during which he learns to perform adequately the fundamental operations and maneuvers of flying. At the end of the course he takes his first cross-country flight, of about 150 miles or two hours, and is ready for basic school, where he will become more proficient in the fundamentals and will start night flying, formation flying and instrument flying. At advanced school he will again practice what he has learned during primary and basic training.

After each flight the cadet's instructor grades him on the maneuvers he has done and on his general control. As the instructors will tell you, anyone can learn to fly if he practices long enough, but the Army can afford to teach only those who can learn at speed far above average. Before a cadet ever arrives at Thunderbird, he has already passed stiff physical, mental and psychological tests, which indicate that he will be able to get through the course in the required amount of time. If, however, a cadet is too slow or temperamental, it will usually appear in the first hours of flying, and the system of daily grades is helpful in eliminating him at an early stage.

### Chinese Pilots Are Diligent

The other half of the day is spent in ground school and athletics. As with flight maneuvers, the cadet begins the study of the essential ground school courses, such as navigation, mechanics and plane identification, at primary school. In some of the classrooms are disassembled parts of a complete plane for the cadets to see and feel and learn, so that they will know their function and how to repair them in an emergency. In other rooms are swarms of model planes hanging from the ceiling, pictures of more planes along the walls, and a camera slide which flashes planes on and off the wall for speedy recognition. After studying plane identification continually during his training of a year or so, a pilot is able to recognize in a split second any friendly or enemy plane,

*(Continued on page 44)*

1926 BYRD AND BENNETT FLEW OVER NORTH POLE
1927 LINDBERGH FLEW THE ATLANTIC
1931 POST AND GATTY—AROUND THE WORLD IN 8 DAYS
AIR ASSOCIATES INC.
1926
1931 BOARDMAN AND POLANDO NON-STOP RECORD . . . 5,014 MILES
1931 HERNDON AND PANGBORN FIRST NON-STOP PACIFIC FLIGHT
1932 JIMMY DOOLITTLE BREAKS SPEED RECORD AT NATIONAL AIR RACES
1932 AMELIA EARHART—FIRST WOMAN TO SOLO-FLY ATLANTIC
1938 HOWARD HUGHES CIRCLES GLOBE IN 3 DAYS, 19 HOURS

# SUPPLYING THE TRAIL-BLAZERS

**Byrd's North Pole flight is ancient history,**
**But Air Associates even *then* made aircraft supplies!**
**"Sports flying"—air races, exploration, barn-storming—**
**Pushed back the limitations of flight**
**And blazed a trail for aviation progress.**
**Air Associates equipment**
**Helped break flight records all through the years,**
**And flies today with air heroes...all over the world.**

## AIR ASSOCIATES, INC.

BENDIX, NEW JERSEY

Chicago Los Angeles Dallas

Coveralls handed down by cadets who vacated Sweetwater for them are girls' uniforms. Lydia Linder of Brooklyn and St. Sgt. C. W. Lewis chart an instrument problem in the Link. Group Commander C. Sprouls talks preflight with Irma Cleveland, Faith Buchner, Martha Lunday, Mary Jane Stephens and Anabelle Kekic.

# FINISHING SCHOOL F

*THEIR official emblem is a female gremlin and they call themselves "Fifinellas." They're the gals who ferry military planes for the Air Transport Command. The first classes recently graduated at Houston and at Sweetwater, Texas, under the direction of Jacqueline Cochran, famous aviatrix.*

*Women ferry pilots are trained by the Army Air Forces Flying Training Command in a twenty-two and one-half-week course. Original entrance requirements called for applicants to have 200 or more hours in the air. But now they need only a minimum of thirty-five hours to their credit. They also must pass the rigid Army "64" physical examination given aviation cadets, be between the ages of twenty-one and thirty-four, possess high school educations or the equivalent, and be approved by Miss Cochran or one of her representatives in a personal interview. In training they're paid $150 per month; as ferry pilots in the Air Transport Command they receive $250 monthly.*

*At Sweetwater's Avenger Field, the girls receive elementary training in PT-19's and basic training in BT-13's and 15's undergoing instruction in cross country hops by day and by night, and blind flying under the hood. Their advanced training is divided between the single-engined AT-6 and the twin-motored AT-17 (aviation cadets specialize in one or the other). Civilian instructors teach them; Army pilots give their check rides.*

## THE ARIZONA WAY

*(Continued from page 42)*

though he may never have seen one in the flesh before.

So important is good physical condition considered for a pilot that the cadets are required to spend several hours of every day in calisthenics and various athletic activities. No one sport is stressed, however. The aim is to develop all of a cadet's muscles, not to overdevelop a few. Contrary to general belief, most instructors will tell you college football heroes do not necessarily make good pilots because they have so overdeveloped their football muscles they cannot relax them.

Part of the training at Thunderbird consists of lessons in parachute jumping, though not from actual planes. Harnessed to a special device, which gives him the same sensations as a parachute, the cadet rolls out of a cockpit on the top of a tower and lands in a sand pit only a few yards below, exactly as he would with a real parachute. Should the cadet really need to jump during a flight, he knows that his parachute will not fail him because each chute is repacked every sixty days by a group of skilled civilians. Actually there is little need for them, since Thunderbird has one of the best safety records in the country, having recently flown over 150,000 hours without a single fatal accident.

In training with the American cadets at Thunderbird Field I, are a group of carefully chosen Chinese cadets, the cream of young China. Strenuous as the program is for the Americans, it is twice as difficult for the Chinese students, for all their instruction is given in English. Not only do they have to master the fundamentals of flying in nine short weeks—they have to do it in an entirely foreign language. Yet they learn quickly and thoroughly and often put the American students to shame in their determination to make the most of every minute.

Since most of the Chinese cadets have already been in the Chinese Army, either as reservists or in actual combat against the Japs, but have never spoken English before, they are sent to their own pre-flight school at Williams Field, where they receive two hours' instruction a day in English but comparatively little military discipline, and where they can become accustomed to the Arizona climate. During the rest of their training, however, the Chinese cadets are given exactly the same training as the Americans, except that they

Undergraduates parade in natty slacks and blouses as graduates receive wings. Civilian dress is permitted off duty. Helen Duffy, Sweetwater's only girl instructor, greets Betty Taylor and Marian Isbill on AT-17 wing. Red fire bell gets the ding-dong when classes advance up the scale to higher ratings.

# L FOR FIFINELLAS

*But it's not all flying for the girls. On the ground they spend many hours with code, meteorology, physics, aircraft mechanics, theory of flight, military customs, and courtesies and other subjects, and in the Link trainer. Physical exercise includes drill and marching. Khaki coveralls, handed down by the male cadet detachment which vacated Sweetwater for them, are their "work clothes," but the girls have snappy dress uniforms of tan slacks, white shirts and flight caps. Off duty they wear civilian dresses. They live in barracks, six to a room with bathroom facilities for every two rooms. They sleep on regulation Army cots, their furniture is GI and built-in.*

*Army officers and men are in charge of the school. They are also attended by a staff of women selected because of their long experience with girls. Evenings are for study in the barracks usually, but on week-ends there are parties and dances and swimming and tennis. They have a Fifinella clubroom downtown and a big recreation room at the field.*

*Training at Sweetwater is no snap, say the girls. But they like it. "When we advance a notch in our courses," says one of them, "we want to ring bells and yell and laugh." Miss Cochran and the Flying Training Command accommodate them in this way, too. There's a big red fire bell at Avenger Field, and it's kicked around quite a bit these days as classes progress through the courses.*

carry an extra course in English throughout.

The English classes are not at all like an ordinary language class, for grammar must be sacrificed to the acquisition of a large aeronautical vocabulary. There is none of the usual "I see a cat" and "I give you a book." Instead the Chinese cadets learn the meaning of "level off" and "watch your air speed." Now, too, they are being taught American slang which, the English instructors say, they love, but use in the most peculiar places. Moreover, to help bridge the gap between the cadets' meagre acquaintance with English and the aviation instructors' technical conversation and lectures, at least one interpreter is on hand all the time in the flight room and in each classroom.

In all three parts of their training the Chinese cadets are a match for the Americans — and would probably surpass them if it were not for the language difficulty. In fact, they have an uncommon sense of co-ordination and consistently outshine the Americans in many sports, notably basketball and ping-pong. In the dancing lessons which are given to them at Williams pre-flight school, they pick up the steps much more quickly than the average American boy.

Their success in their ground school studies does not come so easily, however. The Chinese students get good marks but they work hard for them. They have a mature outlook on life, more than most Americans, probably because of their long cultural heritage, and realize that they can get out of the course only as much as they put into it. It may take them hours to understand some branch of aerodynamics or meteorology, but once they have mastered it, they usually have learned it forever.

### British Courses Differ

The cadets who respond most quickly to military discipline usually make the best pilots, the flight instructors have noticed. This is particularly true of many who have had commissions in the regular Chinese Army. Of course, they have all had enough flying in China (50 to 100 hours) to warrant the tremendous amount of money which is spent on their training, so that they already know how to fly when they arrive here. But it's a long way from novice pilot to combat pilot, and the Chinese cadets travel the

*(Continued on page 50)*

James A. Pigue (right), safety director of Consolidated Vultee's Nashville division, and Safety Engineer J. J. Futrell have won wide attention by their successful campaign. Pigue is 23 years old.

**Consolidated Vultee's Nashville Division claims the industry's safety record: During the first five months of 1943, it averaged only 1.7 lost-time injuries per million man-hours worked. Other plants will find these details helpful.**

**EACH OF THESE WORKERS** is correctly dressed for his job in accordance with Consolidated Vultee safety standards. Proper work clothes count as much as proper equipment—a fundamental of the Tennessee plant's comprehensive safety program.

# SUCCESS IN SAFETY

**By G. S. HASTINGS**

Manager of Industrial Relations, Nashville Div., Consolidated Vultee Aircraft Corp.

ONE sunshiny day not so long ago a butterfly flew into the ear of an assembly line worker at the Nashville division of consolidated Vultee Aircraft Corporation.

If you ask James A. "Jimmy" Pigue, plant safety director, about the incident — one of the few that have stumped his saftey department — he'll just grin and ask you:

"You couldn't expect a worker to wear ear-muffs in June, could you?"

On the serious side, a review of the safety program at the giant Tennessee plant will convince even the most skeptical that the records being set are more than just luck. In fact, it wouldn't take long to find that most of the credit should go to Pigue and his nine-man staff for the comprehensive safety program they have set up. It might be well to note that "Jimmy" himself is just past twenty-three, an age which undoubtedly makes him one of the youngest industrial safety directors in the business.

The records being shattered at the plant speak for themselves.

*During the first five months of this year, the Consolidated Vultee plant had an average of 1.7 lost-time injuries per million man-hours worked. The average during the first three months of the year for twelve leading aircraft manufacturers in the country was 16.1 lost-time injuries per million man-hours.*

*A short while ago the plant set what is believed to be an all-time record for the aircraft industry in working 2,337,980.4 man-hours without a lost-time accident.*

The nine-man staff, including the director and a full-time optician, is in charge of all safety investigation and education at the plant. The optician cares for both the personal and industrial eye cases of the employes. Since this latter program has been put into effect, eye injuries, usually the most prevalent in a plant of this type, have been reduced from 35 per cent of all injuries to 8 per cent. A reduction of from two to three lost-time eye injuries a month to four in nine months has been accomplished.

Safety is taught the new employe from the beginning. The importance of safety precautions is stressed in a talk given to the new worker before he even starts on his job. Emphasis, too, is placed on the value of the right kind of safety equipment for each job. "Wear your hair net . . . wear it properly." . . . "Wear your goggles . . ." "Wear your safety shoes . . ." These thoughts are drummed into the head of each worker, and close check is made to see that the rules are enforced.

Sixteen kinds of safety goggles, to fit any need, are available to workers at no cost and are selected for the job and fitted to the employes by Jack Hicks, optician and equipment engineer. The division was reportedly

**HOW TO GET SCALPED** is demonstrated by these Consolidated Vultee workers. At the left the girl who wouldn't wear a hair-net learns better, while the one at right violates all precautions by wiping her brow with a running drill in her hand—a major cause of scalpings in industry.

one of the first aircraft plants in the country to have a trained optician available for this service to workers. Hicks also does research on all types of safety equipment, and his findings determine whether the product is used in the plant.

Safety performance at the plant is governed not by competition between departments, but is based on improvement in the department itself. In other words, the better a department gets, the harder it is to win recognition. This is done on a point basis. The department having the best score on a monthly inspection gets to keep a gold trophy on display during the ensuing thirty-day period. Gold shields are then engraved and the department keeps the shield on display indefinitely as the cup goes to the new winner. The department with the worst improvement score for the month from a general safety viewpoint has to keep a large white elephant, made of clay, in full view for thirty days.

Recognizing that safety and cleanliness go hand in hand, an extensive housekeeping program, under the direction of David Sherer, safety engineer in the department, sees to it that accident hazards and untidiness are kept at a minimum. The department getting the lowest score in this respect must take charge of "Boris," a life-sized figure of a tramp, for the next thirty days.

Safety education is stressed by bulletin boards, motion pictures, and lectures. Even though a hazard or bad safety practice among the workers is checked, education as to its dangers continues. Eye injuries are a case in point. Despite the reduction in this type injury mentioned earlier in this article, the Consolidated Vultee division continues its war against eye carelessness.

Their latest is a psychological approach. As foreman and other employes come in for a regular safety meeting, a safety worker gives them an adhesive patch to place over the right eye. The lecture, with its main theme eye injuries and their causes, goes on for ten or fifteen minutes. At the end of this period, the lecturer stops, tells the audience to remove the patch from the right eye and put it over the left. When the talk is completed the speaker admonishes the audience with this thought. "Remember boys, that's how it would be if you lost an eye here due to your carelessness."

The department works in close harmony with the medical department and a standing rule is that no matter how slight an injury is, it must be reported to first aid immediately. This has been an important factor in combatting infection, Pigue explains, as the worker is given less than thirty minutes to report to medical even for treatment of the most minor scratch. To facilitate working of this system, the employe doesn't have to report to his foreman first, but can report to first aid and then to his supervision.

Pigue was recently appointed a dollar-a-year man as a special safety agent for the U. S. Department of Labor and is on a recently-formed committee of the National Safety Council, the duties of which are to set up a system of statistics for the aircraft industry as a whole. The need of such a system is self-apparent, says the director. Due to the rapid growth of the industry during the past two years, it has been impossible for the National Council to keep an accurate check on the safety accomplishments of plants in the industry. The committee expects to off-set this.

The lack of a centralized statistics file is a definite handicap in the industry safety work. Pigue cites one instance which proves this. The lost-time injury records at the Consolidated Vultee plant mentioned earlier are believed to be, if not the best, at least one of the best in the industry. However, it is impossible to say that it definitely is the best because of the situation.

In order to make the comparison, Pigue gained his figures of the average set by twelve other leading aircraft companies by writing to their safety directors. It was his only alternative.

Because of the wide variance in the Consolidated Vultee figures and those of the other companies, there is every indication that the record is among the nation's top.

A native of Wichita Falls, Texas, Pigue moved to Nashville in January, 1940. After high school he studied for two years at the University of Tennessee Junior College, Martin,

**HIS EYESIGHT** was saved by safety glasses, which were shattered when an emery wheel in his shop flew into pieces. The accident occurred in the worker's home workshop, but luckily he had learned in the aircraft factory about safety goggles.

Tennessee, and then a half year at Peabody in Nashville.

An Eagle Scout, he was made a scoutmaster of a Nashville troop before he was old enough to vote and naturally was familiar with Red Cross first-aid methods. He first went to work for Consolidated Vultee in January, 1941, as a first-aid attendant in the medical department. After six months there he moved over to the Safety Division. Less than a year later he was made safety director.

After quitting college where he was taking a pre-medical course, he worked one summer as a reporter on the old Nashville *Times*, and then with his brother, operated a printing firm for several months. He got his actual safety training after joining Consolidated Vultee. His studies mostly were of a regular industrial safety course put out by the U. S. Department of Labor. Ironically enough he now teaches this course to a volunteer class of interested employes at the plant.

The toughest job of all at the plant, says Pigue, is teaching women employes that the safety hair nets required should be worn properly. Six partial scalpings have been recorded at the plant during the past ten months, five of which were due to the failure of the female workers to let the nets cover their heads. In each case the worker decided that it looked better with a "lock out here, and a curl out there." These subsequently became entangled in the machinery and an injury resulted.

The sixth scalping?

It happened to a man. It seems that he needed a haircut.

# GETS 'EM ON TOP

## *Humble - Esso Aviation Gasoline*

**The thundering power of the giant engines that enables our pilots to get "on top" of their opponents comes from 100 Octane Aviation Gasoline, the superfuel that our Axis enemies can't match. Millions of gallons of this fighting fluid have come from Humble refineries, one of which has produced more high-octane aviation gasoline than any other plant in the world.**

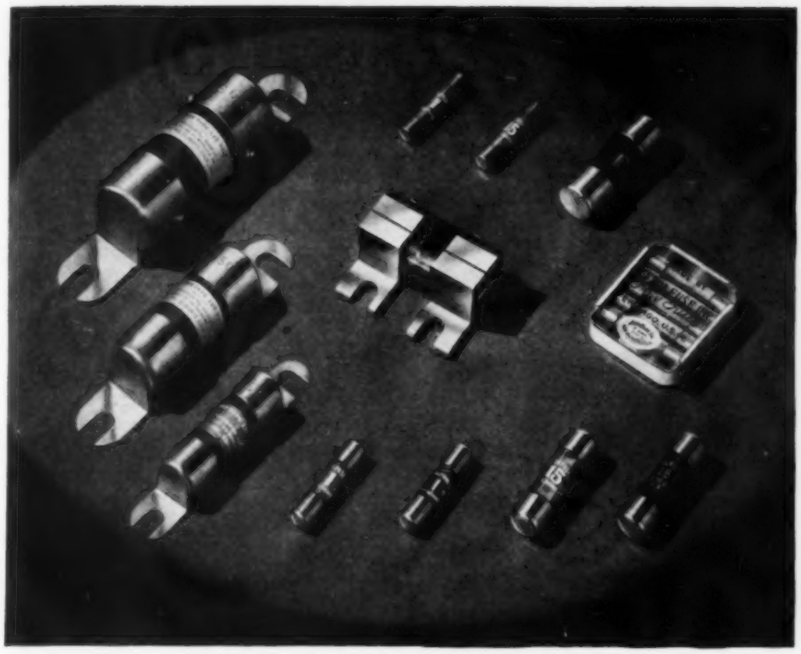
**The production of Aviation Gasoline is only part of the war job that Humble is doing. Other products for our Air Forces include special stratosphere greases and instrument oils, Aviation Engine Oils, rust preventives for aircraft engines and asphalt for airfield runways. To the production of these and many other vital war products the best energies of 13,000 Humble employees are dedicated.**

Esso

***HUMBLE - ESSO AVIATION PRODUCTS***

**Today Humble-Esso Aviation Products serve the vital demands of war; tomorrow they will serve equally well the needs of peace.**

**HUMBLE OIL & REFINING COMPANY**



# American Fighting Machines Require Littelfuses

***Millions of Littelfuses are guarding countless electrical circuits of our fighting equipment in the air, on land, on sea, and undersea***

**Mechanical Depolarization**

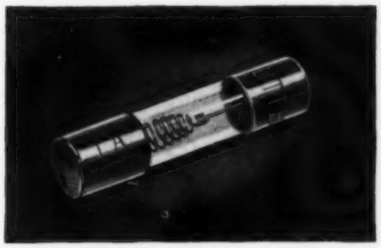
LITTELFUSES USE A MECHANICAL PRINCIPLE THAT ADDS GREATLY TO VIBRATION LIFE. THIS IS MECHANICAL DEPOLARIZATION, EFFECTED BY TWISTING ELEMENT AT 90° RENDERING IT UNRESPONSIVE TO VIBRATION IN ANY PLANE.

## On Guard Where Protection is Vital

Every circuit built into a plane, tank, boat or submarine is now called on to withstand unprecedented shock, surges and vibration.

Precision instruments, dials, indicators, radio, all the delicate electrical mechanisms of aircraft are frequently subjected to the shock of dives from 60° below zero to 120° above—*in seconds*. Fuses that protect their circuits must perform without fail.

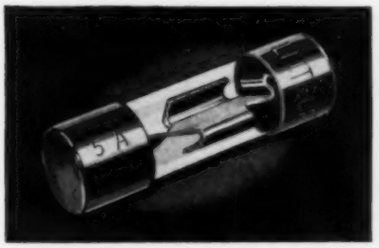
Littelfuses are engineered to meet these and all other extraordinary conditions: By mechanical depolarization, new protection against severest vibration effected by twisting the fuse element at 90°; by spring-and-link elements providing the same protection in smaller fuses; by spring-formed reinforcement counteracting expansion and contraction; by patented locked cap assembly sealing the fuse element against moisture and "perspiration", and preventing caps from loosening.



**Littelfuse Spring and Link Element**

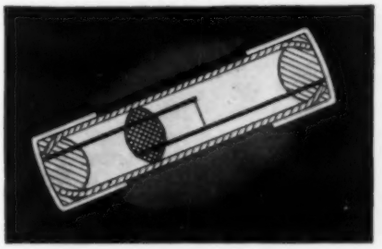
***(For ratings of 5 amps. or less)***

SHORT FUSING SECTION IS HOOKED AND SOLDERED TO COPPER SPRING, AT MIDDLE OF TUBE. OUTER ENDS SECURED BY LOCKED CAP ASSEMBLY. DOUBLE PROTECTION. SPIRAL SPRING PROTECTS FROM VIBRATION, AND ALSO PREVENTS CRYSTALLIZATION DUE TO HEATING AND COOLING.



**Non-Crystallizing Fuse Elements**

IN AIRCRAFT LITTELFUSES, A SPRING-FORMING "GOOSE-NECK," AT ONE END OF THE ELEMENT TAKES UP CONTRACTION AND EXPANSION WHICH CAUSES CRYSTALLIZATION AND CRACKING AT FUSION POINT—ANOTHER LITTELFUSE PROTECTION AGAINST HEATING TROUBLE.



**Littelfuse Locked Cap Assembly**

***(Patented)***

METAL CAPS ARE LOCKED FIRMLY TO GLASS TUBE BY A PROCESS *WITHOUT CEMENT*, THAT UNITES CAP AND TUBE WITH PRACTICALLY ONE-PIECE STRENGTH AGAINST SHOCK AND VIBRATION. HERMETICALLY SEALS FILAMENT AGAINST MOISTURE. PREVENTS CAPS FROM VIBRATING LOOSE.

## The Show-Down Sets the Pace

Besides supplying Army and Navy requirements, over 4000 manufacturers depend on Littelfuse products for sure and uninterrupted performance of their equipment for war use.

**FUSE EVERY INSTRUMENT AND ELECTRICAL CIRCUIT FOR SAFETY —WITH LITTELFUSES**

**Littelfuse Inc.**

4757 Ravenswood Ave., Chicago, Illinois
260 Ong Street, El Monte, California

## THE ARIZONA WAY

*(Continued from page 45)*

path — in a foreign land — fully as quickly and smoothly as the Americans.

At nearby Falcon Field, British cadets, too, are learning to knock the Axis out of the skies. Superficially, their training is quite different, being divided into only two phases: primary and advanced. The primary course is a little longer (seventy hours instead of sixty), concentrates more on steep turns and dives, and starts the cadet on formation flying, instrument flying, low flying and night flying. Both the American and British training, however, cover 200 hours in all.

Like the other four British schools in this country, Falcon Field is operated privately, again by Southwest Airways, and gives both primary and advanced training. The British cadet, therefore, receives all his instruction from civilians until he earns his wings, while the Americans and Chinese are under Army instruction as well as discipline after the first sixty hours.

The differences between the American and British courses are due primarily to the different conditions under which the pilots will fly. The RAF pilots, for instance, need more practice in instrument flying and start using Link trainers earlier because of the English fogs. Out of 1,000 hours of flying, during which he made thirty-two raids on the continent, one RAF pilot was forced to fly on instruments for 615 hours. The British cadets also devote more hours to take-offs and landings at night without lights because, as they point out, they won't have any lights in combat areas.

In contrast to the English climate, the British cadets love Arizona. Some even go so far as to say they would like to stay there forever. Others will tell you with pride that Falcon is the nearest of the RAF schools to Hollywood and that they are going there on their leave.

Just as there are Chinese cadets in training with the Americans at Thunderbird Field, so there are Americans with the British at Falcon Field. The Americans take the same course, prescribed by the RAF, as the British cadets, but are graduated as members of the AAF.

Flying conditions in Phoenix have been all that Connelly had hoped. From the time Southwest Airways started operations on March 24, 1941, they never missed a day of flying for 673 days, until January 27, 1943. And on the day on which the primary schools were finally grounded, the advanced schools, Luke and Williams, were still flying—and have been ever since. By the time cadets have reached Luke and Williams they are able to cope with any weather Arizona has to offer.

To Luke Field go the boys who have been chosen to be pursuit pilots, to Williams, the bomber pilots. The boys at Luke are in general smaller, more aggressive and better at aerobatics and upside-down flying, while those at Williams are heavier, more conservative and more cool-headed.

### Pursuit vs. Bomber Training

Because a pursuit pilot must also be a navigator, radioman and gunner for his plane, a good part of his training, even at Luke, is on the ground. In addition to his regular ground school he is given a course of a few weeks in aerial gunnery at either Ajo or Gila Bend. Shortly before graduation, he is weaned away from the traditional AT-6 trainer and given a few hours of transitional training in a P-40. At last a real pilot, he receives his commission and his wings.

The difference between the training of a pursuit and bomber pilot is primarily in length. A bomber pilot, too, must continue his ground school courses and be capable of filling any job on the plane in a pinch, but in addition he must learn to command thousands of horsepower, to manipulate planes weighing many tons, to use the complicated instrument panel on a modern bomber, and finally to function as part of a crew. Williams Field gives the cadet the first stage of this bomber training. There he flies a heavier twin-engined trainer with a horsepower of 900 horsepower. And there he has his first practice in flying with the other officers of a bomber—the navigator and the bombardier.

When a cadet is graduated from Luke Field he is sent first to an operational training unit, where he is trained in combat techniques and next to a tactical unit, where he is assigned to a squadron and is given practice flying with the other men in his squadron. Then, within a few months, he is off for the great unknown. A bomber pilot, however, has a much longer period of training ahead of him when he leaves Williams. If he is to fly a Liberator or Flying Fortress, he still has three phases of heavy bombardment training to complete before he will be sent to the coast for his final orders.

The bomber pilot can receive the first phase of this training in Arizona, too—at Davis-Monthan Field, Tucson. And one of the first lessons he will learn will probably be that he is only one-tenth of the crew, for it is here that he will meet for the first time the nine men with whom he will henceforth live, fight and possibly die.

Davis-Monthan Field may be compared to a university to which men with various talents come for specialized training. The pilot and co-pilot will learn to fly large four-engined Liberators in all kinds of conditions, in the day and at night; the navigator will study and practice until he can guide the pilot wherever he wants to go; the bombardier will get used to handling the bombsight in flight; the six gunners will spend long hours on the gunnery range, shooting at targets which represent the side-on view of a plane as it would appear in combat with the aerial engineer and the radio operator studying mechanics and radio as well.

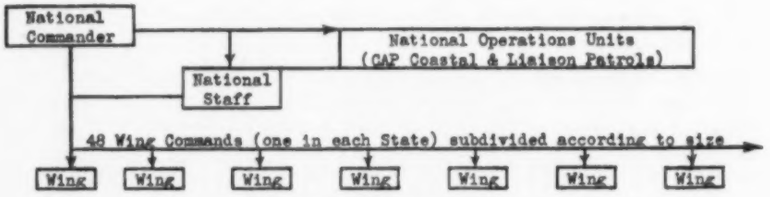
Even better, Davis-Monthan may be compared to a big league training camp, for its primary purpose is to weld together ten highly trained individuals into a smoothly functioning team. For about eight hours of every day these men fly together, each learning to take the responsibility for his particular work and to depend on the other men to carry out their jobs.

As the crew begins to click, they will make practice bombing missions out into the desert. On the way to the target the navigator will call the moves, the pilot will do the flying, the radioman will report position to the field every thirty minutes, and the gunners will operate their turrets and flexible guns. When the target comes into view, the bombardier will take over, and, with the bomb doors open and the target directly in line, call out "bombs away."

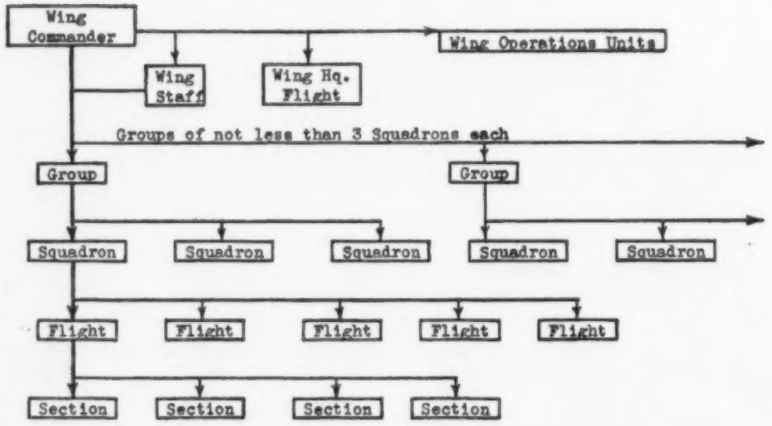
Perhaps they will let go only half the bombs then and come back again for a second blast. Or they may drop all the bombs and come back low to strafe. Or they may speed off to a rendezvous with other planes to practice formation flying, making fast turns and taking evasive action as they must when flying through heavy anti-aircraft fire. Whatever they do, they do it as a team, and, if successful, they celebrate together. Invariably each crew member will tell you that he has the best pilot, the best navigator, the best bombardier and the best gunners in the Air Forces.

Just as each flight crew member learns at Davis-Monthan how important the other nine men are, so he learns there how important the ground crews are. Thanks to the weather in Tucson, the planes can fly twenty-four hours a day. And thanks to the ground crews each plane actually does fly twenty hours a day.

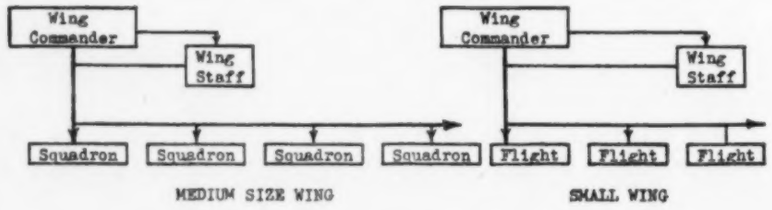
ORGANIZATION CHARTS, CIVIL AIR PATROL




NATIONAL ORGANIZATION




LARGE WING ORGANIZATION




MEDIUM SIZE WING SMALL WING





(Following is an outline of additional courses in the broadened CAP training program. Those marked with asterisk are new.)

| 32- Military | Hours |
|---|---|
| 1. Courtesy and Discipline | 3 |
| 2. Infantry Drill | 20 |
| 3. Safeguarding Military Information | 1 |
| *4. Articles of War | 1 |
| 5. Interior Guard Duty | 4 |
| 6. Reviews and Inspections | 2 |
| 7. Duties of Command and Staff Officers | 2 |
| 8. Leadership and Command | 3 |
| 9. Military Correspondence | 2 |
| 10. Operations Orders | 1 |
| 11. Firearms | 6 |
| *12. Courts Martial | 6 |

| 33- Civilian Defense | |
|---|---|
| 1. Local Civilian Defense Familiarization | 1 |
| 2. Protection Against Gas and Incendiaries | 4 |
| 3. Protective Concealment | 2 |
| *4. Airport Protection | 2 |
| *5. Air-Ground Practice Missions | 10 |

| 34- Pre-flight | |
|---|---|
| *1. Theory of Flight | 6 |
| *2. Aircraft Construction | 6 |
| *3. Powerplants | 10 |
| *4. Instruments | 4 |
| 5. Map and Aerial Photograph Reading | 5 |
| 6. Air Navigation | 15 |
| 7. Meteorology | 15 |
| *8. Civil Air Regulations | 6 |
| 9. Control Tower Procedure | 4 |
| 10. Observation and Reconnaissance | 10 |
| *11. Accident Causes | 3 |
| *12. Instrument Flying | 20 |
| 13. Terrain Familiarization | 5 |

| 35- Flight | |
|---|---|
| 1. Primary Flight Training Missions | 15 |
| 2. Basic Flight Training Missions | 15 |
| 3. Advanced Flight Training Missions | 20 |
| 4. Special Flight Training Missions | 20 |

| | Hours |
|---|---|
| **36- Ground Service** | |
| 1. Crash Procedure | 6 |
| 2. Duties of Servicemen | 5 |
| 3. Aircraft Inspection | 6 |
| *4. Airports | 4 |
| *5. Fire and Wind Protection | 2 |
| *6. Hangars | 4 |
| *7. Aircraft Maintenance | 4 |
| **37- Physical** | |
| 1. First Aid | 20 |
| 1A. Advanced First Aid | 10 |
| 2. Physiological Aspects of Flying | 5 |
| 3. Physical Exercises | 10 |
| **38- Auxiliary** | |
| 1. Photography | 20 |
| 2. Communications | 6 |
| 2A. Morse Code | 8 |
| 2B. Panel Reading | 2 |
| *2C. Codes and Ciphers | 4 |
| *3. Parachutes | 10 |
| **39- Miscellaneous** | |
| 1. Music | 2 |
| 1A. Bands | |
| *2. Languages | |

2 INTELLIGENCE (This Part will cover the Intelligence and Public Relations Function.)

4 OPERATIONS (This Part will cover general rules amplified by present operations directives.)

5 EQUIPMENT (Rules as to aircraft and radio.)

6 SUPPLY (This will cover uniforms, etc., as set forth in GM-45 and addenda.)

7 FINANCE (Rules as to insurance, vouchers, funds, etc.)

8 MISCELLANEOUS (Rules which cannot be classified under the foregoing 7 Parts.)

9 CADETS (Brief Rules as to CAP Cadets who, in general, will follow CAP Rules.)





WASHINGTON, April 5, 1943

**Subject: CAP Rules (Second Installment)**
**To: All CAP Unit Commanders**

1. Herewith are further sections of the new CAP Rules.

2. The organization charts which follow are based on the CAP Rules and illustrate the flexibility of the authorized organization to fit a given Wing or Squadron situation.

3. The continuation of the Personnel provisions herewith cannot be made fully effective until the rest of the Personnel procedure is issued. Effective immediately, however, no membership applications will be accepted without the endorsement of a CAP unit commander. Applicants so endorsed may be accepted as provisional members of units so they can start their training. Further Rules will provide that to attain membership, a provisional member must complete 25 credit hours of CAP training as follows: Civil Air Patrol, 2 hours; Military Courtesy and Discipline, 3 hours; Infantry Drill, 5 hours; Safeguarding Military Information, 1 hour; Articles of War, 1 hour; any other authorized CAP training courses, not less than 13 hours.

4. Additional Military Training courses are outlined. Attached are new Training Manuals on Protection of Military Information and Morse Code, illustrating the type of training material which will be issued henceforth. References are made in the Rules to other CAP Training Manuals not yet issued. The old Training Directives for the respective subjects will be used until the new Manuals reach you.

5. Rules as to CAP Cadets are more flexible than the previous directive on this important subject.

6. In addition to the old CAP directives listed in GM-78, the following are obsolete and may be removed from files: Training Directives 2, 5, 12, 19, 20, 32; Operations Memorandum 4; Operations Directives 1, 2, 6, 11, 14; General Memoranda 20, 21, 22, 23, 24, 25, 26, 30, 35, 41, 48, 58.

EARLE L. JOHNSON, National Commander.



50-b

# *For Sky Control...*

## WE • PLAY • OUR • ROLE

Supremacy in the air is the No. 1 requisite to a successful offensive. That means more and better planes. Better planes means finer component parts. To get a "plus" performance we must manufacture pumps and other parts with a "plus" quality.

In this war, that "plus" performance is essential to holding that supremacy. With resolute courage and perseverance aircraft accessory manufacturers have shown their WILL TO WIN. They merit a salute to be heard around the world.

**ROMEC PUMP COMPANY • ELYRIA, OHIO, U. S. A.**

*Manufacturers of Aircraft Pumps and Accessories*

**BUY WAR BONDS ★**

***FIRST IN DEPENDABILITY***

*Romec*

## Texas Bomber Factory, World's Largest, Being Enlarged for Engineers

Expansion of the Fort Worth plant of Consolidated Vultee Aircraft Corporation by an addition of 112,000 square feet of space for engineering office and storage facilities at a cost of approximately $350,000 was recently announced. It is already the largest aircraft factory in the world.

Extension of the building housing the maintenance and boiler shop to the full length of the administraton building will provide additional space for over 1,000 engineering draftsmen and layout men.

The new addition will be constructed of reinforced concrete and steel. The upper floors of the building will be air-conditioned and converted to huge drafting rooms. The addition will be completed in November.

## Nash-Kelvinator Gets Helicopter Order; Sikorsky Moves Plant

The Sikorsky helicopter designed and built by Sikorsky Aircraft division of United Aircraft Corporation will be constructed in quantity for the Army by Nash-Kelvinator Corporation under license from United Aircraft, it was recently announced.

Helicopters for the Army are also being built at the new Sikorsky factory at Bridgeport, Conn., but Nash-Kelvinator's construction will be the first large-scale production of helicopters.

The first helicopter airport in the United States will be operated at Sikorsky's new plant in Bridgeport, former plant of the Crane Company. Transfer of the Sikorsky division from its previous location in Stratford marked the final separation of the Vought-Sikorsky division.

B. L. Whelan has succeeded J. R. Miller as acting general manager of the Sikorsky division.

## Major Gardner Named Institute Chairman

Major Lester D. Gardner has been elected chairman of the council of the Institute of the Aeronautical Sciences, Robert R. Dexter, secretary of the Institute, announced.

Bennett H. Horchler was elected executive vice president to succeed Major Gardner, and George R. Forman was elected assistant to the president, Dr. Hugh L. Dryden of the National Bureau of Standards, Washington, D. C.

## Douglas Output Soars in California; Mid-American Units to Reach Peak Production Later This Year

Douglas Aircraft Company surpassed all records by turning out 13,096,000 pounds of combat and cargo planes in May, recently released production figures revealed. Reflecting an increase of 150 per cent over May, 1942, and of 698 per cent over May, 1941, output at Douglas constitutes more than 10 per cent of the total U. S. warplane production for that period. This record was made with only Douglas' three California plants at peak production, though its three mid-America factories should reach that mark by mid-summer. May deliveries of SBD dive-bombers exceeded the scheduled monthly quota by 40 per cent. Production of Douglas-built Flying Fortresses was forty-one ahead of schedule as May ended. At the parent Santa Monica factory, ahead of quotas on all models, thirty-one extra bombers and cargo planes were produced. Douglas currently is turning out eight different combat and cargo planes, Vice President F. W. Conant said. Four-engined transports, twin-motored paratroop and cargo planes produced in May equalled the best four-year total output of the Douglas DC-type commercial plane, he declared. The record 13,096,000 poundage in May did not include hundreds of complete planes delivered to the armed forces in the form of unassembled parts and spares.

## West Coast Council Names Special Group to Boost Efficiency

To produce "more airpower per hour" by greater refinements in manufacturing processes, is the objective of the newly created manufacturing committee of the Aircraft War Production Council, Inc.

Composed of the top manufacturing brains of the Council's eight-member airframe companies, the new committee will act as a policy body to co-ordinate the activities of all other groups concerned with various phases of manufacturing and production.

Chairmanned by F. W. Conant, Douglas vice president in charge of manufacturing, the committee is geared to develop "more and better production" in each of the council companies.

Vice chairman is H. E. Ryker, Vega's executive vice president in charge of manufacturing. Ryker also will be responsible for operation of the materiel section of the committee, which will concern itself with maintenance of a steady, uninterrupted flow of materials to warplane-producing plants.

Other section chairmen, appointed at the committee's organization meeting include: Plant production, R. A. Von Hake, Lockheed vice president in charge of manufacturing; outside production, C. W. Perelle, Consolidated Vultee production vice president; and government reports, Gage H. Irving, assistant to the general manager of Northrop.

At its first meeting, the committee created a specialist panel on field service and spare parts, operating through a project group composed of Otto P. Graff (Vega), Harvey Tafe (Consolidated Vultee) and Frank Lyons (North American). This project group will co-ordinate the flow of important information on the operation of warplanes in the battlefronts and assure plenty of spare parts delivered to fields of action where planes must be kept constantly in perfect working order.

**INJECTION carburetors at the new Illinois division of Bendix Aviation Corporation are being produced in great numbers. Here's the final inspection line of the plant.**

## 7,200 Planes Built in May; Output Still Climbing

Nearly 7,200 military planes were produced in May, the War Production Board revealed recently, a step-up of monthly production rate by 1,000 planes in two months. This new production figure included combat, transport and trainer aircraft. Total air-frame weight approximated 60,000,000 pounds. The WPB predicted that production would increase in June, and continue rising until a ceiling is reached imposed by the country's supplies of aluminum, copper and alloy steel.

An earlier WPB report revealed that the output of heavy bombers in April was 18 per cent above March. And while no actual figures were given, this indicated production of about 600 four-engine bombers in April, as the March production exceeded 500.

## Threat to Aircraft Industry's Survival Seen in Renegotiation

Aircraft manufacturers' case against war contract renegotiation law as it stands at present was presented by Francis A. Callery, vice president of Consolidated Vultee Aircraft Corporation, in testimony before House Naval Affairs Committee on June 22, declaring the aircraft industry is "concerned not with wartime profits but with the survival of our business." Chief criticisms of present law were that it does not allow for necessary reserves for postwar transition, that renegotiation is made before taxes—which he said makes no more sense than computing profits before payrolls — and that provision for termination of contracts at present does not give adequate protection to the contractor and the thousands of workers in the plants.

Callery emphasized that working capital in the aircraft industry is dangerously inadequate in relation to the immense volume of its business. In discussing termination of contracts, he said "drastic cutoff in production would mean chaos in the communities in which we are doing business." He declared aircraft companies are ending up with less profit than companies filling in on war work and which will have large demands for their own products after the war. He urged that "seed money" be available in hands of aircraft manufacturers if they are to continue in business.

## Major Construction Program Adds New Facilities to Ryan Aeronautical Operation at San Diego

Several new factory buildings, including a large final assembly structure and a new office and engineering building, are under construction at the Ryan Aeronautical Company's San Diego, California, plant, and will be ready for use soon to meet the company's increased production schedules.

T. Claude Ryan, president of the company, said the new final assembly building is designed to manufacture much larger aircraft and assemblies than Ryan has built in the past. It will have giant 200-foot span trusses, and clearance of thirty-five feet under the trusses will allow huge cranes to lift completed assemblies vertically from one production fixture to another.

The building program represents a major expansion of facilities at Ryan and will provide space for several large and expanding departments, it was reported. The new offices and engineering building will contain a cafeteria for Ryan employes, and an enlarged, completely equipped photographic laboratory will be installed in the engineering building. Adjoining the final assembly building, additional first aid rooms will be provided, and a service building for the company's automotive equipment will be constructed.

When the present building program is completed, the Ryan plant, including factory and office buildings and paved areas, will cover thirty-eight acres. Parking lots and emergency water supply and fire protection facilities are included in the new construction program.

## $500,000 Addition for Lycoming Facilities

The Lycoming Division of The Aviation Corporation, Williamsport, Penn., has expanded its facilities with the addition of a new $500,000 plant at South Williamsport, Penn., P. E. Garlent, vice president of The Aviation Corporation and general manager of the division, recently announced. The added facilities, Garlent stated, will permit Lycoming to increase its subcontract work by approximately 30 per cent, and will make possible expansion of proposed engine production by about 20 per cent. The new plant, which was converted from a plant owned by Keystone Silk Mill Company, will handle subcontracting work for the United States and Britain.

## Borg-Warner Acquires Supercharger Enterprise

Borg-Warner Corporation of Chicago has acquired McCullough Engineering Corp., Milwaukee, Wisconsin, manufacturers of superchargers, through a cash purchase of all stock, C. S. Davis, president of Borg-Warner announced recently. Robert McCulloch, head and founder of the McCulloch Corporation, will remain as president and director of the company, Davis stated.

## WPB Plans Warehouses

Warehouses handling aircraft hardware and components to be available to aircraft manufacturers in limited quantities for emergency, experimental and miscellaneous uses will be established soon under a plan announced by the War Production Board recently.

## Bell Creates 3 Divisions; Woodson Is Georgia Mgr.

Growth of the company has necessitated establishment of three divisions to cover Bell Aircraft Corporation's construction of fighter planes, manufacture of ordnance equipment and building of bombers at Marietta, Georgia. Ray P. Whitman, first vice president of the company, became manager of the Niagara Frontier division, which includes the Niagara Falls airport, Elmwood Avenue and Main Street plants. Vice president and Assistant General Manager Omer L. Woodson became vice president and manager of the Georgia division, which includes the Bell bomber plant at Marietta, Georgia. Carl F. Lozon continues as manager of the company's ordnance division, and Charles L. Beard, secretary and treasurer, became administrative assistant to Lawrence D. Bell, president and general manager.

## Increased Plywood Demand, Fewer Supplies, Seen by WPB

Glider and cargo aircraft programs which are being reconsidered may increase slightly the demand for aircraft plywood, though present production is in excess of requirements, and will probably continue to be, government officials recently advised the Hardwood Plywood Industry Advisory Committee of the War Production Board in Washington. The plywood industry's main problem is manpower, and this shortage is affecting production of hardwood plywood for ships, boxing and other war uses. Lower wage rates than some other war industries have taken many employes, and while women have been hired wherever possible, they have not entirely replaced the lost manpower, the committee reported. Inventories are low on log supply and adhesives are becoming more critical and should be conserved, an official of the Chemical Division stated.

## Hollow Steel Propeller Output is Tripled

The American Propeller Corporation, subsidiary of the Aviation Corporation, tripled their production of hollow steel propeller blades for combat airplanes during the past six months, over that for the previous six months, William F. Wise, executive vice president of The Aviation Corporation, recently announced.

Production at the Toledo plant was begun one year ago.

## WPB Names Committee to Speed Aluminum Parts

Appointment of an aircraft aluminum products control committee for the purpose of stepping up output of aluminum aircraft parts and distributing them equitably, was announced recently by the War Production Board. The committee, named by Charles E. Wilson, WPB executive vice chairman, is headed by Arthur H. Bunker, director of WPB's aluminum and magnesium division. The forgings section of the aluminum division, it was also announced, has moved from Cleveland to the headquarters of the aircraft scheduling unit at Wright Field, Dayton, Ohio.


B-H

MANUFACTURERS of SHEET METAL and TUBULAR ACCESSORIES

LIFE RAFT PUMPS

CONTRACTORS TO ALL LEADING ENGINE and PROPELLER MANUFACTURERS

B-H AIRCRAFT CO.

LONG ISLAND CITY NEW YORK

WITTEK

AVIATION HOSE CLAMPS

Standard Equipment on CONSOLIDATED LIBERATOR B-24

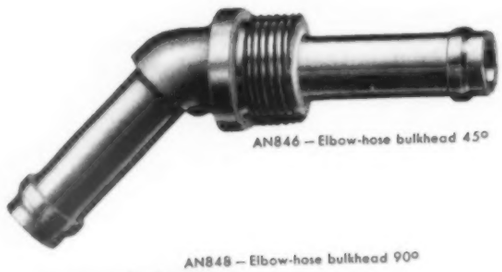
Since the beginning of modern aviation Wittek Hose Clamps have been known as the standard of the industry. Today they are being used by the nation's leading military aircraft and engine builders.

ARMY NAVY

WITTEK Aviation HOSE CLAMPS

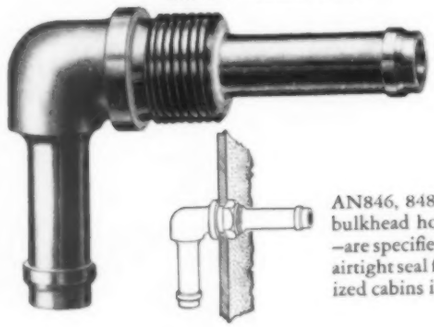
# DURAL
## HOSE FITTINGS FOR PRESSURIZED CABINS

AN849 — Connector-hose bulkhead, straight



AN846 — Elbow-hose bulkhead 45°

AN848 — Elbow-hose bulkhead 90°



AN846, 848 and 849—bulkhead hose fittings—are specified where an airtight seal for pressurized cabins is required.

Latest addition to Hartwell production parts is the new bulkhead hose fitting series, AN846, 848 and 849, designed for pressurized cabins. Produced on specially built machines and on a 'round-the-clock schedule, these parts are now available in any desired quantities, together with Dural hose fittings of the AN840 to 847 series.

All Hartwell hose fittings, except those made from barstock, are pressure tested by air, under kerosene, to 100 lbs. gauge pressure. Close production controls and complete inspection after each operation are enabling us to maintain all blueprint tolerances.

**HARTWELL** AVIATION SUPPLY COMPANY

***Aircraft Production Parts***

3417 CRENSHAW BLVD., LOS ANGELES • DALLAS, TEXAS • DETROIT, MICH. • KANSAS CITY, KAN.

**IN THE WAR,** but not overseas, is this gaudily-painted B-17-F Flying Fortress. She's a flying classroom used by the Second Army Air Force to train student pilots in the finer points of operations. The program is a co-operative venture on the part of the Army and the Boeing Aircraft Company

## Brewster Keeps Ahead of Production Schedules

"Brewster beat all production schedules during April and May and it looks like June will be our best month yet," Frederick Riebel, Jr., president of Brewster Aeronautical Corporation, recently stated. Fifteen hundred new aircraft workers are needed at Johnsville, Penn., to keep up the production pace on dive bombers and fighters, Riebel added.

## Furniture Factories in Fairchild Pool

In Fairchild's Burlington, North Carolina, operation, where AT-21 trainers are now built, a large portion of the work is sub-contracted, with Drexel Furniture Co., of Drexel, Morganton and Marion, N. C., furnishing major subassemblies. In addition, Fairchild Burlington is making parts of the plane for Bellanca and McDonnell, which will make the trainer under license.

## Aircraft Accessories Expanding

Aircraft Accessories Corporation will open its ninth plant in the Kansas City, Kansas, area to handle increased production, R. C. Walker, president, announced recently. The new plant will occupy space formerly used by an automobile concern.

## Instrument Technicians Trained

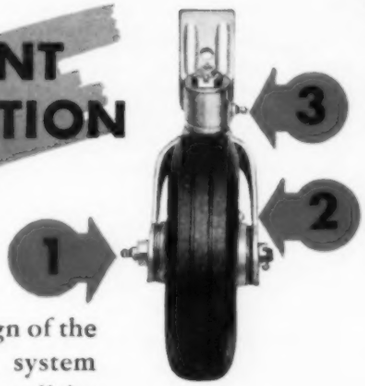
Non-commissioned officers of the Army Air Forces are being trained at the Ternstedt Aircraft Instrument plant, under the direction of the Technical Training Command, as specialists in the handling of gyro horizon and directional gyro indicators, to qualify them for emergency repairs and adjustments in the field, E. F. Fisher, general manager of the Fisher Body Division of General Motors, recently announced.

# Quick Facts on the Care of...

# SCOTT

## TAIL WHEEL ASSEMBLIES

## 3 POINT LUBRICATION

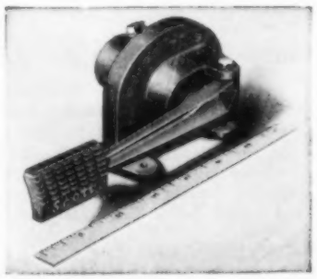



The practical design of the Scott lubrication system makes greasing simplicity itself and insures long service with a minimum of attention. Lubrication is recommended after *every twenty-five flying hours, (every ten hours on sandy fields), at the following points:*

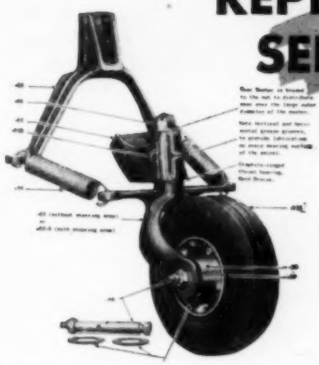
1. Positive lubricating AXLE, supplying grease to heavy-duty ball bearings in hubs.
2. HUB, also supplying the bearings in the hubs (protected from dirt and water by Garlock Grease Seals).
3. SWIVEL, lubricating *all* wearing surfaces by the Scott center-ring and vertical grease-channel method of lubrication.

## *New* SCOTT BRAKE PRESSURE UNIT

A new Scott development, the B-711 Brake Pressure Unit, is a simple, positive-action, hydraulic pressure cylinder for all light aircraft and other applications. Weighs 21 ozs. Full instructions for installing in place of present master cylinders. List price $24.75 per set (per airplane). Can be supplied on AA-2X priority, or better.



## REPLACEMENT SERVICING



Replacement of worn parts before damage to adjacent parts occurs, is an important step in conserving your Scott Assembly and obtaining best operating results. The illustration above shows by order number the component parts of the Scott Interchangeable Steerable and Full Swivel Assembly and Standard Full-Swivel Assembly. (The latter assembly can be converted to the former by adding the required parts.)

*To purchase parts, it is necessary to secure priority ratings granted to CAP and CAA War Training Services.*

### PARTS

(In ordering, the following designation method should be used: part number for a bushing on a Cub Cruiser Tail Wheel No. GC-15 is "GC-15-01B")

-01 Attaching Bracket, complete with Swivel Bearing (s).
-01B Swivel Bearing (s) only.
-02 Fork only (without steering arms).
-02S Fork only (with steering arms attached).
-03 Attachable Rudder Arm to control Steering Action.
-04 Connectors from Rudder Arms to Tail Wheel Assembly.
-05 Dampner Assembly only. (Wear-Washer Brazed to the Nut).
-06 Axle Assembly.
-07 Pressed Steel Hub with Bearings (without tire).
-08 Ball Bearings only, for Pressed Steel Hubs.
-09 Garlock Grease Seals only.
-010 6 x 2.00 Solid (Cushion) Tire.

ARMY E NAVY

Scott

AVIATION CORPORATION

LANCASTER, N. Y., U. S. A.

DESIGNERS AND MANUFACTURERS OF SPECIAL EQUIPMENT FOR THE AIRCRAFT INDUSTRY

**SUPPLIERS TO THE U. S. ARMY AND NAVY AIR FORCES AND LEADING AIRCRAFT MANUFACTURERS**

IRVIN
Air Chute
The Life Preserver of the Air

SYMBOL OF SAFETY

The name "IRVIN" on the harness means the chute is produced in an Irvin Factory with over 20 years of experience and skill in chute-making.

Literature can be had by school or training executives for the asking. Address Main Office, Buffalo, N. Y.

**IRVING AIR CHUTE CO., INC.**

1670 Jefferson Ave. BUFFALO 8, N. Y.

Southern Representative
LEON McKENNON, Love Field, Dallas, Texas

Other Factories in United States, Canada and England.

IRVIN air Chutes

SERVING THE UNITED NATIONS' AIR FORCES

# AIRLINES

FOLEY FREDERICK LEWIS HEININGER

E. J. FOLEY has been appointed assistant to William Littlewood, vice president of engineering for American Airlines, Inc., the company announced recently. Foley will also act as assistant to the chairman of American Airlines' planning committee. DR. JOHN H. FREDERICK, Professor of Transportation at The University of Texas and marketing and aeronautical writer, has been appointed economic consultant to Braniff Airways, Inc. Dr. Frederick will continue his connection with The University of Texas and his writing on marketing, distribution and air transportation. ARTHUR DEE LEWIS, research analyst in the Department of Economic Planning of American Airlines, Inc., was chosen as instructor for a commercial air transportation course at New York University. RALPH L. HEININGER has been named general traffic manager of Chicago and Southern Air Lines, Inc., D. D. Walker, vice president of the company, announced. Heininger has been acting general traffic manager for C. & S. since May, 1942.

## CAB's First Report on Carrier Revenue Shows Freight Upturn

In the first statistical report on operating revenues and expenses of airlines issued by the Civil Aeronautics Board, it was revealed the eighteen domestic air carriers in the United States received more than $220,000 in increased passenger revenue for January of 1943 over January for the preceding year. Revenue from express and freight increased approximately $235,000 or nearly 40 per cent over the same period in the preceding year. The airlines received $5,477,776 from passenger revenue, $1,797,826 from mail and $616,323 for express and freight for the month of January, 1943.

For the year ending January 31, 1943, the eighteen domestic air lines showed an increase in passenger revenue of nearly $351,000 and while the increase in revenue from mail was only $10,000, express and freight revenues increased more than $4,000,000 over the previous year.

## Annual Air Traffic Conference To be Held in Denver July 21-22

Continental Air Lines will be host to the annual Air Traffic Conference of America, July 21 and 22, at Denver, Colorado, Paul J. Carmichael, Continental's general traffic and cargo manager, announced recently. The agenda for the conference, a division of the Air Transport Association of America, will include wartime and postwar traffic discussions, problems in air tariffs, schedules and related subjects, and all sessions will be held at the Cosmopolitan Hotel, Carmichael said.

## Busy PAA Schedule Across Gulf

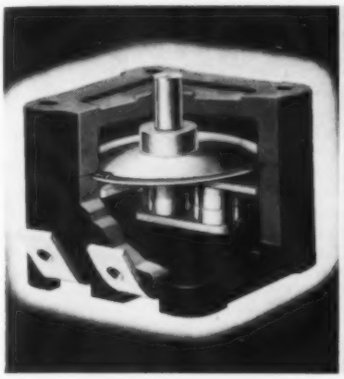
Pan American Airways inaugurated a new 2,000-mile air service from New Orleans to South America when a four-engine Boeing Stratoclipper took off from New Orleans June 13 with fourteen passengers, including Juan T. Trippe, President of Pan American. Twenty-two-ton high-altitude Stratoclippers will fly a thrice-weekly schedule, leaving New Orleans on Sundays, Tuesdays and Fridays, and leaving Balboa, Canal Zone, on Mondays, Thursdays and Saturdays.

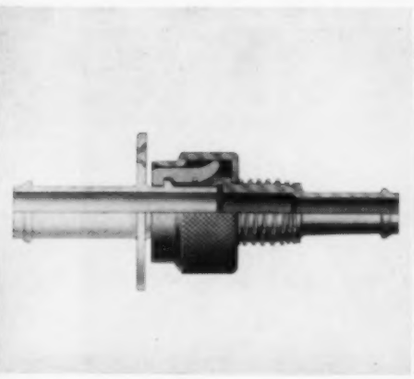
## PAA Mileage Expanded

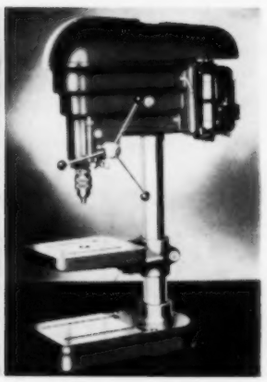
Pan American Airways transports flew 117,683,337 passenger miles during the first three months of 1943, compared with 100,453,873 during the last three months of 1942 and with 74,975,995 in the first

*(Continued on page 57)*

# NEW PRODUCTS







## Allied Switches Sealed From Dust

A3 and A5 switches manufactured by Allied Control Company of New York are sealed in Bakelite cases to protect their contacts against dirt, dust, sand and oil, common factors of switch failure. This protection feature is being used by manufacturers of electrical control units for aircraft and ground equipment, especially where climatic conditions cause failure of equipment. Operating characterstics of Allied A3 and A5 switches include single pole, single throw, A3 normally closed, double break; A5 normally open, double break; non-inductive, 50 amperes at 12 and 24 volts DC and 110 volts AC; 1½ to 3½ pounds operating pressure; plunger travel differential 0.006 to 0.002 of an inch; over travel 0.050 to 0.070 of an inch at maximum pressure, 10 G vibration for either horizontal or vertical positions; five ounces weight; and 1 15/16 by 1 15/16 by 1 19/32 inches.

## Quick Disconnect Couplings Offered

Wiggins Quick Disconnect Couplings, manufactured by E. B. Wiggins Oil Tool Company of Los Angeles, are used to connect fuel, oil and cooling lines, fluid instrument lines, air and vacuum lines, and in engine test cells and other ground equipment. A quick pull on the knurled ring disengages the coupling. By placing the two ends of the coupling together and pushing lightly on the knurled ring, a tight connection is made. Wiggins Quick Disconnect Couplings are used in inaccessible places where a wrench can not be turned. They eliminate the possibilty of cross threading, loose connections and abraded gaskets, the manufacturer stated. The couplings have been tested from zero to 500 pounds pressure and to 29 in. Hg vacuum, and can be used wtih 100 octane gas, high aeromatic fuels, engine lube oils and cooling fluids at wide range of temperatures.

## Plastic Panel At Low Cost

An airplane panel accurately machined to accommodate levers and knobs, conforming rigidly to multiples of curves specified by designers, is a product of the new technique in plastic molding for fabrication of parts and panels in cylindrical shapes or simple and compound curves at low cost, developed by Theodore Moss Company of Brooklyn, N. Y. The panel measures 27 inches long by 7¾ inches wide, and bears data in depressed white enameled letters which are legible by color contrast on the black panels.

## Sixty Models of Drill Presses

Helmet head drill presses, in over sixty models, manufactured by the Boice-Crane Company, Toledo, Ohio, are available in one, two, three or four spindle types; high and slow speed, bench or floor types; slotted or trough table. Balanced and vibrationless, the drill presses are sealed against common hazards. Five pre-determined efficient speeds allow for operations. A new self-centering 30-degree pressure angle 6-tooth involute spline is an additional feature.

## AIRLINES

*(Continued from page 56)*

quarter of 1942, and plane miles flown amounted to 12,920,655 in the first quarter of 1943 compared with 10,461,109 in the preceding quarter and 7,596,499 in the first quarter of 1942.

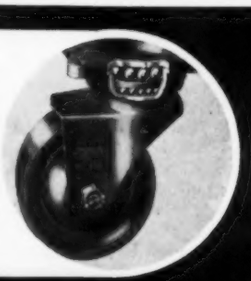
## C. & S. Observes Tenth Birthday

Chicago and Southern Air Lines celebrated their tenth anniversary at a dinner given by the National Aeronautic Association at the Hotel Statler, Washington, D. C., June 25. Gil Robb Wilson, president of NAA, was toastmaster, and Carleton Putnam, president of Chicago and Southern, was principal speaker.

## Domestic Applications on Active Calendar

The Civil Aeronautics Board has announced in a memorandum circulated to all air carriers and applicants for airline operating certificates that it would restore applications for new airline service, except those involving foreign air transportation, to the active calendar.


Scientific swivel construction. Two sets of ball bearings take care of offset and lateral thrust.



DARNELL CASTERS

All wearing parts carbonized and hardened to give an unusually long life of satisfactory foolproof service.

Write for new FREE MANUAL

DARNELL CORP. LTD., 60 WALKER ST., NEW YORK, N. Y.
LONG BEACH, CALIFORNIA, 36 N. CLINTON, CHICAGO, ILL.

## Brewster Elects Wilson

Ira Stuart Wilson, vice president of Fleetwings Division of Kaiser Cargo, Inc., Bristol, Pa., since 1940, was recently elected vice president in charge of finance of Brewster Aeronautical Corporation. Mr. Wilson, previous to his connection with Fleetwings, was affiliated with McKinsey Wellington and Co., and Arthur Anderson and Co.

## Bendix Elevates Two

W. H. Houghton, formerly comptroller of Bendix Aviation Corporation and a director, was recently elected treasurer of the corporation, and Arthur E. Raabe was elected vice president and group executive of Bendix. Houghton succeeds E. R. Palmer, who will remain as a director and member of the executive committee.

## Douglas Appoints Management Committee

Appointment of a management committee to streamline administration of the company's network of plants and operations, has been announced by Donald W. Douglas, president of Douglas Aircraft Company. The management committee will assist him in shaping and supervising executive functions in factories located at Santa Monica, El Segundo and Long Beach, California, at Oklahoma City and Tulsa, Oklahoma, and at Chicago. Appointed to the committee were Frederic W. Conant, vice president and director of manufacturing; Arthur E. Raymond, vice president and director of engineering; John M. Rogers, vice president and contract administration; Ralph V. Hunt, vice president and comptroller, and A. M. Rochlen, director of industrial and public relations.

## Doak Elects

The Doak Aircraft Company, Inc., Torrance, California, recently announced the election of Nelson E. Grace, senior vice president and factory manager, and Leonard Comegys, attorney to the board of directors, Stephen F. Hinchliffe, vice president in charge of sales, and Eldore E. Rosier, vice president in charge of contracts, are new vice presidents.

## Hennen Succeeds McCulloch as Nashville Plant Manager

J. W. Hennen, formerly assistant division manager of Consolidated Vultee Aircraft Corporation's New Orleans operation, has been named manager of the Nashville division, I. M. Landon, executive vice president of the company, announced recently. Hennen previously was production chief of the Boeing Aircraft Company plant at Seattle, Washington, until he joined Consolidated as production manager of their Vultee Field, California division. Hennen succeeded Robert McCulloch, who resigned to return to the West Coast.

## Ryan Eliminates Rejects by Quality Control System

The Ryan Aeronautical Company operates a unique quality control system which prevents repetition of factory errors after first spotted by inspectors. Faulty parts, poor material or other deviations from specifications are promptly reported by inspectors on an Inspection Discrepancy Report, which Ryan developed. This report is rushed to the Quality Manager within thirty minutes after the inspector spots an error. The Quality Manager passes the form to a liaison man, who tracks down the cause of the error and reports back. Within a few hours, and in critical cases, within a few minutes the Quality Manager takes action on the condition reported and makes his recommendations for correction. Within twenty-four hours he receives a reply to his recommendation from the department head involved, indicating the action taken. The action reported taken is confirmed by one of the Quality Control liaison men.

Before this system went into operation, $1,400 worth of material was scrapped between October 18 and October 24, and shortly after the system was installed, $100 worth of material was scrapped, Ryan reports. This system has also speeded production, Ryan states, in that it brings engineers and production men into closer teamwork.

## Pacific Airmotive Adds Curtiss Propellers to Line

Pacific Airmotive, Burbank, California, is now manufacturing a complete line of service and assembly equipment for Curtiss electric propellers, in addition to their manufacture and supplying of Hamilton Standard units for service and assembly work.

## New Vengeance Being Built

The final product of the original A-35 model Vengeance dive bomber contract was recently delivered to the AAF, completing one part of a multiple contract with the Nashville division of Consolidated Vultee Aircraft Corporation. This plane was delivered four months after the first ship on this contract was turned over to the Air Forces. Full plant facilities have now been turned to the production of the latest version of the A-35.


STEEL RULE Dies SINCE 1900

SPEED AND ECONOMY

We Are Making Dies for Many of the Leading Airplane Plants.

*For Cutting Everything — Even Wood*

J. A. Richards Co. Kalamazoo, Michigan

PROPELLERS OF SUPERIOR PERFORMANCE

- 15 Years of Propeller Production
- Calibrated and Designed for Maximum Efficiency
- Constructed for Lasting Service

FAHLIN MFG. CO. COLUMBIA MO.

REPAIR SERVICE

- For All Types and Makes of Propellers
- 2-7 Days at the Factory
- CAA Authorized Station

FAHLIN MANUFACTURING COMPANY

SECURITY IS CONFIDENCE

*We have confidence in the future of American industry . . . industry with the "sure 'nuff" and the "can do".*

THE AIRCRAFT STEEL & SUPPLY COMPANY

378 INDUSTRIAL BLVD Dallas, Texas

WICHITA, KANSAS

St. Louis, Mo. Oklahoma City, Okla. Tulsa, Okla.

FAIRFAX AIRPORT Kansas City, Kan.

## Planes in U. S. Will Number 500,000 by 1950, Says CAA

The Civil Aeronautics Administration "soberly contemplates" half a million planes, private, commercial and military, in service by 1950, the OWI stated recently in a report that predicted a vast air transportation system. Present wartime expansion of air transport, accompanied by world-wide development of airways, communications and airports, which will be available to civilians after the war, are factors pointed out by the OWI in its prediction. There will be about 865 major airports in the United States by the end of 1943, exclusive of certain military airdromes, while less than 100 such fields existed in 1940, the OWI said.

## Navy Perfects Simple Way to De-salt Water

A simple method for removing sodium salts from sea water, making it drinkable for men on life rafts, has been developed by the Navy. A wounded or weakened man in a life boat can produce a quart of drinkable water unassisted by using four small plastic bags and two chemical compounds compressed into soapcake size. Ten packets of the chemicals can be carried on an aircraft rubber raft, and this would provide a twenty-day supply of water for one man. The process was discovered by Lt. (j.g.) Claire R. Spealman and perfected at the Naval Medical Research Institute, Bethesda, Md., under the direction of Lt. William V. Consolazio.

## Greyhound Bus Lines Seek Helicopter Passenger Routes

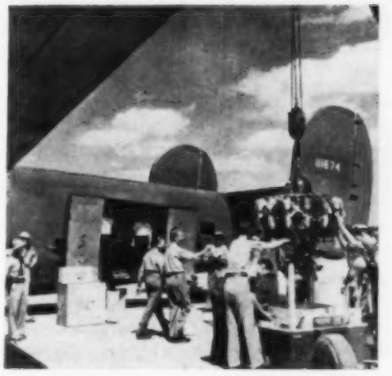
A nationwide helicopter air bus service was proposed by the Greyhound Corporation in a recent application to the Civil Aeronautics Board. The highway bus company's application called for passenger, mail and express service by helicopter or similar aircraft over their present bus routes, with present bus terminals and bus garages for use as landing ports and hangars. C. E. Wickman, company president, stated that the air bus line service would supplement transcontinental and global airlines by operating between areas not served by airlines. Wickman added that several helicopters may be made available for experimental use soon.

## Armor-Stripped Vests Worn by Bomber Crews

Bomber crews operating from British bases over Europe are now wearing body armor to protect them from low-velocity missiles such as flak, the War Department recently announced. The armor, consisting of a sleeveless canvas slip-on covering the airmen from neck to hips, weighs only twenty pounds. Thin steel plates are slipped into transverse pockets of the jacket.

## OWI Reveals Performance, Specifications of Uncle Sam's Newest Craft for Air Cargo Service

VS-44-A . . . Long Range



C-87 . . . 3 Tons Across Sea

C-46 . . . 40 Men, "Several" Jeeps

Performance data on America's cargo planes, including specifications of several proposed behemoths of the skies, has been revealed in a report on air transport by the Office of War Information.

Descriptions of the proposed craft included these:

Kaiser-Hughes HK-1. A giant, all-plywood flying boat, 400,000 pounds gross weight, being built primarily for cargo. Static testing of some sections has begun. Eight engines, 8,000 gallons fuel capacity, 120,000 pounds cargo capacity. Average cruising speed, 174 miles per hour. Wingspread, 320 feet; length, 218 feet. (OWI says HK-1 is "being built" and is largest aircraft "actually under construction.")

Fairchild C-82. A part-metal, 50,000-pound cargo plane with a rear door that can be lowered as a ramp and with an interior hoist.

Waco C-62. All wood. Two engines. Gross weight 33,500 pounds.

Of existing aircraft in the "super" category, OWI reported Glenn L. Martin's "Mars" (140,000 pounds gross weight and world's largest aircraft) has been modified with large hatches and a loading track for cargo use; that Lockheed's "Constellation" (73,500 pounds gross weight) is being tested as a troop carrier; that Boeing's 314 "Clipper" flying boat (84,000 pounds gross weight) has been modified by stripping seven of its nine compartments of about a ton of soundproofing and other equipment to make room for cargo; that Vought-Sikorsky's VS-44-A "Flying Ace" (59,225 pounds gross weight) has a longer range than the Boeing 314 and faster cruising speed on short range; that Consolidated's C-87 "Express," (modification of the B-24 bomber) has a gross weight of 58,000 pounds with three-ton average long transoceanic cargo capacity and will hold only twenty passengers with crew of five; and that Curtiss C-46 "Commando" (originally designed for thirty passengers as airliner) is now carrying forty paratroops, or "several" jeeps and is "considered the most efficient two-engine cargo carrier for hops under 1,500 miles."

## Scholarships Offered by Consolidated Vultee

Establishment of scholarships in leading universities and technical schools by Consolidated Vultee Aircraft Corporation was announced June 24 by President Harry Woodhead. Financed by an initial fund of $50,000, undergraduate scholarships will be awarded to engineering students who show unusual promise during their first three years of study and fellowships to postgraduate engineers. Exchanges between faculty members of universities and technical schools and company staff engineers will be arranged periodically and company engineers will have opportunity to return to selected schools for advanced study and research.

## Franklin Engine Used in New Experiments

Franklin aircooled engines are being used in many experimental installations, and recently two 130-h.p. Franklin engines were installed in a CG-4A troop-carrying glider made by Northwestern Aernautical Corporation. These engines, a product of Aircooled Motors Corp., Syracuse, N. Y., model number 6 AC-298, are of the six-cylinder, aircooled, horizontally opposed type. Experimental installations of the Franklin engines include the Sikorsky helicopter, the Langley twin-engine plastic-plywood plane, and the Northrop Flying Wing. Now in quantity production is the model 4ACG-199-H3 Franklin engine, a horizontally opposed, aircooled, geared engine.

## Army Sharpens Training Set-up with New Units

Creation of twelve "flying training wings" to further subdivide the supervisory duties of officials in charge of the nation's program to produce pilots, bombardiers, navigators and gunners, has been announced by Major General Barton K. Yount, commanding general of the AAF Flying Training Command. Four wings have been activated within each of the three training centers.

## Washington Service for 3 New Routes Approved

The Civil Aeronautics Board has authorized three new air routes into Washington, D. C., from the west, which will be put into operation as soon as Army approval is obtained. The new routes will require no new equipment or pilots, but facilities will come from reduction of less important routes, it was stated. The three routes sanctioned are a nonstop between Toledo and Washington by United Airlines Transport Corp.; between Dayton and Washington, via Columbus, Ohio, and Wheeling, W. Va., by Transcontinental & Western Air, Inc., and between Lexington and Washington via Frankfort-Lexington, Ky., and Charleston, W. Va., by Eastern Air Lines, Inc.

 *(Continued from page 27)*

**DUCK CLUB MEMBERS** are CAP'ers forced down at sea and rescued. Here's one, a Texan, who is telling fellow flyers about conditions out on the waves during his night initiation into the "club." This CAP volunteer is past 50, a veteran of the last war. At his base is one of the oldest A. & E. mechanics in America.

### "By Grace of God and Smitty"

In the operations and radio room two women chart the constantly changing positions of the patrol planes. Several of the CAP women at the base are flyers themselves, but women are not allowed to fly coastal patrol. "Our prize radio expert was recently drafted," says the Captain in charge. "He was a wonder at keeping open the two-way communications, and we miss him like the devil."

Eight women and sixty-seven men work at the base. A number of the men's wives have taken jobs in their distant home towns so that the husbands can afford to work here for the Civil Air Patrol. The list of former occupations includes: an undertaker, tobacco salesman, furniture merchant, carpenters, plumbers, an artist, photo-engraver, liquor salesman, photographer, accountant, policeman, lawyer, electrician, doctor, oil-burner maintenance expert, garage mechanics. They are old and young, rich and poor. "All I know," says Major Hugh R. Sharp, Commander of the base, "is that they get on well together."

For bravery in the rescue of a comrade at sea, Commander Sharp and his co-pilot, CAP Lieutenant Edmond I. Edwards, were awarded the Air Medal by President Roosevelt at a White House ceremony in February, 1943. According to a CAP report which received wide publicity, Sharp and Edwards had brought their Sikorsky amphibian down on a rough sea twenty miles offshore to save Lieutenant Harry T. Cross, who was floating in the water badly injured and burned. His little land plane had already sunk, taking the observer with it to his death. Sharp and Edwards hauled Lieutenant Cross aboard, but the left wing float had been damaged in landing on the ten-foot swells, and the amphibian was in danger of capsizing. To balance the plane, Edwards crawled out on the right wing where he clung for nearly eleven hours as the plane was taxied toward shore and then towed by a Coast Guard boat.

Said a CAP captain who has left his insurance business in the hands of assistants for the duration, "Being mere civilians, we've had some colossal battles with red tape, getting supplies, fighting priorities and all that. For a good many months we were without Very pistols, flares, rubber suits and boats. There was a time when we had less than half a dozen planes fit to fly. But we're over the hump and everything is getting better now."

"I used to be a bus driver," said one of the flyers, "and a good one, too —never had an accident in five years. That's a more nervewracking job than this is."

Said another pilot whose companion was lost when their engine failed offshore in March but who was himself rescued after twelve hours adrift in a rubber boat, "Yes, we lost three men last winter, and they were our pals and we don't forget them. I'm forty-one years old and I can't do combat flying because the Army won't take me. But I figure we aren't getting on with this war any too fast. Flying is something I can do, so I'm doing it."

Another of the pilots is a veteran of the last war and a former gentleman rider whose horses won ribbons in Madison Square Garden shows. He is also a hunter and a yachtsman. "I've sailed small boats from Cabot Strait to the Bahamas," he said, "and across to the coast of France. Sailing helps you with flying, I think. You know a bit about sliding off to le'ward and sea changes."

A fifty-nine-year-old pilot who is an eminent psychiatrist from Boston said with a smile, "No, I don't psychoanalyze the boys. They have fairly rugged nervous systems or they wouldn't be flying out to sea every day. We get a look at some remarkable sunrises and sunsets, and more of the ocean's green and purple and black and silver than anybody else in these parts, I guess. We fly by the grace of God and Smitty, that's how we function. Be sure you mention Smitty."

Smitty is Captain Everett M. Smith, fifty-one years old, veteran of a Motor Transport outfit of the AEF in France in 1918, and an engineer of varied talents. He keeps the engines going and personally sees to the mechanical details that makes the difference between life and death. In the early part of this war he went to China and assembled planes for General Chennault's Flying Tigers. Since coming home he has been bossing the mechanics and improvising maintenance gear for the CAP. When a plane strikes a seagull and breaks a longeron, when a wing needs recovering or parts begin to rust, Captain Smith and his crew take over. A certain type of plane was very hard to start on cold mornings last winter, so he resurrected an old engine that had been used as a seaplane mooring, made it run, mounted it on the back of a truck at propeller height, fixed a coupling to the propeller hub and cranked by machinery thereafter.

The shop is full of benches, presses, machines, tools and gear originated by Captain Smith, as a result of which the base, for all its meager financial resources, can now do major engine overhauling jobs. "Smitty's" latest ideas are on life-saving devices. In crashes at sea, the doors on either side of the cabin usually jam. But there is now in the plane cabin a lever which the pilot pushes when a crash is imminent; this pulls the pins from the door hinges so that both doors fall off and disappear just before the plane strikes. To make a plane stay afloat, Captain Smith has filled the rear end of a cabin with tin tanks soldered tight. "You see," explains a pilot, "visibility is one of the vital factors. A rubber boat drifts at two or three miles an hour, and in wintertime if you lose it, the man can't possibly last the night. But this plane with tanks has its tail painted bright yellow for visibility. It floats obliquely with its engine in the water and its tail sticking out, a beacon twelve to fifteen feet high and visible, with luck, ten miles away. We're putting tanks in other planes as quick as we can manage it."

### This Jap SAVED by CAP Searchers

*American pilots usually hunt down treacherous Japanese with a vengeance. But with the Civil Air Patrol recently, it was a different matter.*

*In response to a call from a Federal Relocation Center, the CAP flight stationed at Fillmore, Utah, spent two days searching for a Jap who was lost in the mountains. When they spotted him, the Flying Minute Men directed ground crews to his rescue —and return to safety for all concerned.*

**By TONY HAGMANN,**
**Field Representative**

*Takeoffs and Landings*—If you have enough money for a settin' hen and a dozen eggs, a yen for one of those cute little Texas Pre-fab houses, then all you need is a AAA3 priority and a need for an extra flight school room or a lookout station or CAP business and the deal is yours . . . This is hot off the griddle . . . we called Winfield Morten and checked up.

*In Dallas*—Back from the Dark Continent are Gerry Mulligan and Julius Hudson—both as full of good will as the nothing-to-nothing score of a ball game. If anybody will write us and tell us that they like it over yonder, we will give 'em a free sub to SOUTHERN FLIGHT.

Russell B. Miller has been flying the whale patch for some time . . . Egypt, Russia, Africa, just like Houston, Dallas and Austin . . . Lt. Massey, 5th Ferrying Command, tole us that if anyone was on their way to India, they said they were "going to see the muscle dancer" . . . and we're wondering . . . Jack Greiner of the air show business, and now with American Airlines, got married up in Chi.

Doug Hayward bought the National Aircraft Brokerage of Love Field, and a small box of aspirin. He will continue the business in a new way and wants it known that he is the sole owner from now on out . . . In the CAA office are Wayne Tuttle, Harold Young, Melvin Dunn and Robert H. Landen . . . to assist in the maze of examinations, etc., which do go on and on and on.

Anybody in need of an office or secretary or phone service or anything try Aviation Service, 242 Air Term Bldg. . . . New business opened with the idea to give personalized sec. service for anybody with the need for a part-time deal . . . two wonderful gals running it. (Well!)

★

*Bristol, Tennessee*—Mrs. Alfred Zachry, president of the 99'ers in Tennessee, is also a flying grandmother. She has four grandsons and one granddaughter who dote on braggin' about her abilities as a pilot. At fifty (and looking not a day over 39) Mrs. Zachry took out for a local airport and in eight hours was a solo pilot. She was a private pilot in thirty-five hours and thinks flying such a thrill . . . more power to her . . . we do, too.

★

*Marion Melcher Reports from Kansas City, Mo.*—R. S. (Swede) Knowlson, well-known on our Municipal Airport, recently skyrocketed to local fame by having a salad named for him at the Airport restaurant. . . CAP members roared into Mexico, Missouri, for three-day maneuvers the end of May. Among their accomplishments were: formation flights, mapping missions, reconnaissance missions, practice bomb dropping, message dropping and pickups, and dropping of suppies by parachute. All Kansas City squadrons participated, with Squadron 2, commanded by Capt. Larry W. Green, sharing honors with two other Missouri Squadrons on competitive missions, for which it was awarded a silver engraved loving cup. Lieut. Col. Earle Johnson, national commander of the CAP, addressed the Missouri wing . . . The Old Muddy chewed at the dikes of the Municipal Airport and private planes flew to adjacent air fields, while operators on the field (including TWA, Mid-Continent and Missouri Aviation Institute) took heed of Public Works Director A. C. Everham's caution to move equipment to higher and safer ground. Fortunately the pumps pumped, the sandbags puffed defiant chests and the dikes held. All is well once more after a week of serious flood threats . . . Mrs. George Arcentales gave the Kansas City Unit of the Women's National Aeronautical Association a bird's-eye view of life in Ecuador, including aviation, customs, ceremonies, styles, vegetation, foods and the perils of driving mountainous roads. The regular June meeting was a Pan-American event, with dinner at Guadalupe Center, and Mexican food to carry out the motif.

★

*Birmingham, Alabama.*—The Birmingham Aero Club elected a new group of officers for the next twelve months and were invited to hear the "swan song of the old". Did they


FORT WORTH AVIATION SCHOOL

Fearadio

Aeromarine AIRCRAFT INSTRUMENTS

CONTINENTAL MOTORS — Powerful as the Nation — AMERICA'S STANDARD

MAGNAFLUX

Franklin

Stinson

menasco

THURSTON AIR WING FABRICS

*We Salute . . .*

THE AIR TRANSPORT COMMAND

For a tremendous job of tranportation of men and equipment, **well done.** It takes trained pilots with the ability to fly in all kinds of weather, under all conditions to keep up the record of the Air Transport Command. The nucleus of their personnel came from private aviation, privately trained, from private training schools.

**SERVICE . . . TRAINING . . . DEPENDABILITY**

AIRCRAFT SALES CO.

DISTRIBUTORS

Meacham Field — Phones 6-5491 and 6-5492 — Fort Worth, Texas

mean the Duck Song? Steadham Acker, one of the directors, is an old member of the Duck Song Fraternity.

The new officers are: Dan R. Hudson, president; T. C. Arnold, Alex C. Montgomery, Don D. Campbell, vice presidents, one, two and three; Harry W. Hoile, secretary; George W. Cowden, treasurer; Edith Wideman, recording secretary.

Sorry we are to tell you that the Air Carnival which the club presented so beautifully each year has joined a long list of "out for the duration". Please put a tab on a couple of war bonds to pay the freight on the first show they put out after we help rid the globe of these fiesty chiggers who are givin' us all this trouble . . . it'll be worth while.

We cribbed this from Dan R. Hudson—X Scc. of the BAC.

This is the July roundup . . . 'Bye now.

## Texas Aircraft Finance Company Organized

The Aircraft Acceptance Co., Dallas, Texas, has been formed to finance all phases of aviation with emphasis on retail purchases of planes and flying courses. Executive officers, all of Dallas, are W. E. Walker, president; F. E. Austin, Jr., secretary and treasurer; Major W. F. Long, vice president; and Tom Collins, vice president and general manager. The new company is an all-Texas institution with a trained aviation personnel to render service to the entire aircraft industry. Offices are located at 1601 Republic Bank Building in Dallas.

by
CHARLES A. ZWENG
Author of
"Radio & Instrument Flying," Etc.

## FLIGHT INSTRUCTOR

A new and different book—a must for every Flight Instructor, and a book needed by every student. Printed with the new easy-to-read type and with all flight maneuvers fully illustrated. This book shows the new "series of turns" and "series of eights". Here will be found standard methods of flight instruction with explanations of flight maneuvers in primary, intermediate and advanced training.

Other new features include flight examiners and methods of grading. A new section covers information concerning Load Factors. Typical flight instructor's examinations "multiple choice" are covered in the last section. 480 pages handsomely bound in blue leatherette with gold letters. Price $4.00 postpaid or C.O.D.

## OTHER OUTSTANDING AVIATION BOOKS

**COMMERCIAL and PRIVATE PILOTS:** New "Aeronautical Training" fully covers new multiple choice examinations, with drift off-course and alternate airport problems plotted and solution given. Commercial examinations are shown in separate section of the book. Navigation, Meteorology, Aircraft, Engines and CAR covered. Just published—12th edition only $3.00 postpaid, or C.O.D.

**RADIO and INSTRUMENT FLYING:** by Charles A. Zweng, Instructor, U. S. Air Corps. New 1941 Edition covering new important material. Written especially to prepare the pilot for government examination for "instrument rating." Radio-Telephone Permit included with Meteorology, Radio-Orientation, let-down, off-course and alternate airport problems. Only $4.00, postpaid.

**A. & E. MECHANICS RATING:** Airplane and Engine Mechanics—Can you pass your written test? Send for new quiz book covering Airplanes, Engines, and Mechanes' Civil Air Regulations. 156 pages, fully illustrated, with new multiple choice examination questions. Only $3.00, postpaid or C.O.D.

**FLIGHT INSTRUCTOR:** A new quiz text covering the scope of the new multiple choice examination for flight instructor rating. Illustrated with diagrams. $3.00, postpaid, or C.O.D.

**GROUND INSTRUCTOR:** Written for the student preparing for "Ground Instructor Ratings." Excellent for class work. Covers Navigation, Meteorology, Aircraft and Theory of Flight, Engines and Civil Air Regulations. $3.00 postpaid or C.O.D.

**GROUND INSTRUCTOR RATING:** Contains "Multiple Choice" examinations on Navigation, Meteorology, Aircraft and Theory of Flight, Engines and CAR. Nomenclature and aviation dictionary in back of book. It's new and different. Something you cannot afford to be without. $3.00 postpaid. Or it may be purchased in combination with "Ground Instructor" for $5.00.

**NAVIGATION PLOTTER:** (Dept. of Commerce type) is necessary for all problems involving drift, let-down and off-course, including alternate airport problems. May be used when taking examination. Complete with large leatherette Navigation Note Book and instructions, only $4.00 postpaid.

**AIR NAVIGATION** (Gold Medal Edition) includes meteorology, just published, $3.50.

**METEOROLOGY:** New edition for pilots by Lieut. Commander Halpine, $2.75 postpaid or C.O.D.

**SIMPLIFIED CELESTIAL NAVIGATION** by P. V. H. Weems and E. A. Link, Jr. $3.00 postpaid.

**NEW DALTON NAVIGATION COMPUTER** (Type E-6B), $10.00.

**PAN-AMERICAN NAVIGATION SERVICE**
12021 Ventura Boulevard
NORTH HOLLYWOOD, CALIFORNIA

**FOR SALE: TIRES WHOLESALE**

**New factory stocks. Our Specials: 6.00x6 non-skid 7.00x4. 8.00x4 smooth 2-ply $8.75. 4-ply $10.75. Tubes $3.25. Large stock 6.50x10, 7.50x10, 8.50x10, Culver 5.00x4, new production 4-6 ply, 8"-10" and all sizes tail wheel tires. New Goodrich 6x2 solids $1.45. Big stock Tires, Propellers, Spark Plugs, and Batteries. Rush delivery in any size, supplying many of the largest operators at lowest prices. Shipment C. O. D. Inspection allowed, guaranteed merchandise.**

**SPARK PLUGS FOR SALE: Correct specifications for your engine. New B. G., Champion, A. C. in stock. Immediate delivery. Reading Aircraft batteries—Sensenich Propellers. Operators' discounts.**

**BOB TRADER AERO SUPPLY**
**Municipal Airport, Pittsburgh, Penna.**

*Attention!*

**CAP MEMBERS**

SOUTHERN FLIGHT's CAP Directives, formerly inserted in ALL copies of the magazine, are now included ONLY in the CIVIL AIR PATROL EDITION going to subscribers who are in the CAP.

It is possible that a number of SOUTHERN FLIGHT subscribers have not advised this office of their CAP membership. As a result they may receive the regular edition instead of the Civil Air Patrol edition. If this happens to YOU — and you want the CAP Directives — please notify us promptly and we will change your mailing accordingly.

PLEASE NOTE—The CAP edition differs from the regular magazine only in the insertion in it of the CAP Directives. All of the regular features appear in both editions.

**SOUTHERN FLIGHT**
**Circulation Department**
P. O. Box 750 Dallas, Texas

*Loans* - **AIRPLANE** - *Finance*

AIRCREDIT INC.
AIRPORT TERMINAL BLDG., MEACHAM FIELD, FORT WORTH
GENE ROYER, Sec'y.-Gen'l. Mgr.

*Need Money?*
Borrow On Your Airplane
THE AIRCREDIT WAY
Low Cost — Easy Terms — Quick Service
Capital Loans to Contract Operators.
Write, wire or call for details.

ECLIPSE

SHELL

**JARDUR**
Bezelmeter Aviation Chronographs, Waterproof Aviation Wrist-Watches and Precision Aviation Accessories

HUMBLE

CAMBRIDGE INSTRUMENT CO INC

TEXACO

# NAMES YOU KNOW . . .
## *Products You Trust*

SPERRY

Scarab
WARNER AIRCRAFT CORP.

Whether it is Parts, Accessories or Service, a name you know on the aviation product you buy is like meeting an old friend you respect and trust.

BIG

HAMILTON STANDARD PROPELLERS

In the air, dependability is a *must*. Without it, flying becomes an uncertain business; there can be no assurance of safety or of scheduled arrival; chance becomes an unwelcome co-pilot.

LYCOMING Engines

SOUTHWEST AIRMOTIVE deals only in products and service you can trust. We believe you are entitled to the best that aviation offers . . . and you will always get it here.

MAGNAFLUX

BENDIX SCINTILLA

RANGER ENGINES

PRATT & WHITNEY U.S.A. DEPENDABLE ENGINES

SOUTHWEST AIRMOTIVE

**COMPANY**

Stromberg CARBURETORS

Pioneer

WRIGHT AIRCRAFT ENGINES

**VEGA**

LOVE FIELD DALLAS, TEXAS

*"Airline Maintenance for the Private Owner"*

KOLLSMAN PRECISION AIRCRAFT INSTRUMENTS

FREEDMAN-BURNHAM ENGINEERING CORP.
ADJUSTABLE PITCH PROPELLERS

LOCKHEED

PESCO
PUMPS AND ACCESSORIES

THE DETROIT FREE PRESS — S

# Pound Saved in Plane Is Worth $2,000

The light metal-wise aviation industry is making practical application of the maxim about a penny saved, and has even paraphased it to read: "A pound saved is $2,000 additional earned."

A pound reduction in weight in a plane like the DC-3 increases revenue during its operating life approximately by $2,000. This lesson in flying thrift was given by L. T. Miller, of the Glenn L. Martin Co., Baltimore, at the SAE National Aeronautic meeting in New York Thursday.

Mr. Miller, in his speech reported in the above news item, pointed out the value of weight saved in a *commercial plane*. "When *military* operation is considered," said Mr. Miller, "the result can be even more staggering."

BOOTS AIRCRAFT NUTS, fabricated from sheet metal and having all the tensile strength of machine nuts, weigh appreciably less than competitive nuts. In many instances, they have only ⅓ the weight. In actual use they save up to 65 pounds per airplane.

## LIGHTNESS Keeps 'Em Firing Longer

Thanks to the lightness of Boots all-metal, self-locking nuts, which protect a Flying Fortress, it can carry 200 extra rounds of .50 caliber bullets. This extra ammunition weighs about sixty pounds—the weight saved by using Boots Nuts, in place of other nuts, on a heavy bomber.

Boots Nuts are not only lighter than other nuts—they're tougher, too. No amount of plane vibration can loosen them. They withstand the corrosive action of chemicals, salt water and weather. And they can be re-used again and again. They literally "outlast the plane."

Boots all-metal, self-locking nuts, used on every type of U.S. aircraft, meet the specifications of all government agencies.

**"They Fly With Their Boots On—*Lighter*"**

# BOOTS

*Self-Locking Nuts For Application In All Industries*

BOOTS AIRCRAFT NUT CORPORATION ★ GENERAL OFFICES, NEW CANAAN, CONNECTICUT